# CENTRAL INDIANA TRANSIT STUDY COMMITTEE

*Legislative Services Agency*
*200 West Washington Street, Suite 301*
*Indianapolis, Indiana 46204-2789*
*Tel: (317) 233-0696 Fax: (317) 232-2554*

## MEETING MINUTES[1]

| | |
|---|---|
| **Meeting Date:** | **September 10, 2013** |
| **Meeting Time:** | **9:00 A.M.** |
| **Meeting Place:** | **State House, 200 W. Washington St., Room 431** |
| **Meeting City:** | **Indianapolis, Indiana** |
| **Meeting Number:** | **2** |

**Members Present:** **Sen. Patricia Miller, Chairperson; Sen. Brent Waltz; Sen. Jean Breaux; Sen. Greg Taylor; Sen. Luke Kenley; Sen. Michael Crider; Sen. Timothy Lanane; Rep. Cindy Kirchhofer; Rep. Jeffrey Thompson; Rep. John Price; Rep. Jerry Torr; Rep. Greg Porter; Rep. Cherrish Pryor; Rep. Ed DeLaney.**

**Members Absent:** **Sen. Brandt Hershmann; Rep. Michael Speedy.**

### I. Call to Order

Senator Miller, Chairperson, called the meeting to order at 9:06 a.m. The committee agreed to schedule its third and fourth meetings for October 3 and October 31, respectively. Committee staff distributed written testimony from Roger Hollands on behalf of the Anderson-Muncie Public Transportation Coalition in support of public transportation for Indianapolis and central Indiana. See Exhibit A.

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[1] These minutes, exhibits, and other materials referenced in the minutes can be viewed electronically at http://www.in.gov/legislative Hard copies can be obtained in the Legislative Information Center in Room 230 of the State House in Indianapolis, Indiana. Requests for hard copies may be mailed to the Legislative Information Center, Legislative Services Agency, West Washington Street, Indianapolis, IN 46204-2789. A fee of $0.15 per page and mailing costs will be charged for hard copies.

## II. Senator Brent Waltz

Senator Waltz presented three counterproposals to the central Indiana transit plan discussed during the 2013 legislative session. First, he suggested that roads should be expanded because studies indicate that most central Indiana residents would not use mass transit. Next, he proposed a frame-off restoration of the IndyGo bus system to serve all of central Indiana. Finally, he mentioned bus rapid transit as a successor to previous light rail proposals due to its lower capital costs and greater scalability.

Representative DeLaney and Senator Waltz discussed the appropriate level of leadership from the legislature in establishing a local transit or transportation plan. Senator Kenley emphasized the importance of partnering with local officials. Representative Pryor asked Senator Waltz whether his counterproposals were independent of each other or could be implemented simultaneously. Senator Waltz answered that the proposals are interconnected and that implementation should be determined at the local level. Senator Taylor inquired whether a transit system based on IndyGo and funded by Marion County taxpayers would eventually provide benefits to neighboring counties and taxpayers. Senator Waltz stated that any system would have a regional perspective, but that Marion County would have a seat at the head of the table.

## III. Anna Tyskiewicz Gremling and Sean Northup, Indianapolis Metropolitan Planning Organization (MPO)

Ms. Gremling, Executive Director, and Mr. Northup, Assistant Executive Director, of the Indianapolis MPO, explained the organizational structure, funding sources, and program and other responsibilities of the MPO. See Exhibit B. They confirmed to Senator Breaux that they sought input from citizens at locations throughout Indianapolis in formulating its regional transportation plan. Senator Taylor inquired whether the proposed plan was driven by population centers rather than job creation. Ms. Gremling and Mr. Northup indicated that riders can transfer to local circulators to reach jobs that are not located on the main routes. Representative Pryor confirmed that the regional plan does not currently contemplate the exercise of eminent domain.

## IV. Christine Altman, President, Central Indiana Regional Transportation Authority (CIRTA)

Ms. Altman described the membership structure of CIRTA, which is set forth at IC 36-9-3. She explained that CIRTA does not have taxing authority, but is funded through contributions from its members, which are used to leverage federal funds. Ms. Altman stated that an imbalance between populations and resources creates challenges for CIRTA's regional governance structure.

## V. Ron Gifford, Executive Director, Indy Connect Now

Mr. Gifford presented the Indy Connect funding plan, which he described as fully funded and scalable. See Exhibit C. Senator Kenley and Mr. Gifford discussed the feasibility of using an existing statutory revenue stream, such as a county option income tax, as a dedicated source of funding. Representatives Torr and DeLaney and Senator Kenley discussed whether the long-term cash flow analysis is balanced. Senator Waltz asked whether difficulties in actually receiving federal funds could affect the overall funding. Mr. Gifford stated that such difficulties could add some costs to the plan. Senator Lanane and Mr. Gifford discussed the use of long-term bonds to provide 15% of capital revenues. Representative DeLaney asserted that a major obstacle to commuter traffic in central Indiana is the terminus of I-69 in northeastern Marion County.

**VI. Professor Michael Hicks, Ball State University and Indiana Transportation Association**

Professor Hicks summarized five studies concerning bus ridership, transit finance, and the economic impact of bus transit. See Exhibit D. Professor Hicks stated that the broad conclusion of the studies is that the benefits of bus transit accrue directly to individuals who are typically low income and transit dependent and that, as the availability of transit expands, the benefits accrue indirectly to individuals who are not dependent on transit.

Professor Hicks told Senator Breaux that fixed transit routes result in observable savings with respect to assistance programs such as Temporary Assistance for Needy Families (TANF) and the Supplemental Nutrition Assistance Program (SNAP, formerly food stamps). Senator Waltz and Professor Hicks agreed that a multipronged approach to transit planning is good. Professor Hicks confirmed to Representative DeLaney that the expansion of a regional plan to additional cities would likely extend similar benefits as well.

**VII. Indiana Citizens' Alliance for Transit (ICAT)**

Tim Maloney, Senior Policy Director for the Hoosier Environmental Council, spoke to the committee about the environmental and energy related advantages of public transit. See Exhibit E. He also introduced the following ICAT speakers:

Kim Irwin, Executive Director, Health by Design
Sarah Meyer, Independent Living Advocate at accessABILITY Center for Independent Living and member of IndyGo's Mobility Advisory Committee
Sara Laycock, Economic and Community Development Liaison, Metropolitan Indianapolis Board of REALTORS (MIBOR)
June Lyle, State Director, AARP Indiana
Carly Weidman, ICAT

Ms. Meyer described her personal experiences as a person who is blind and who uses IndyGo, saying that transit is a necessity rather than a luxury. Senator Lanane commented on the difficulty of using public transit across counties. Ms. Meyer and Representative DeLaney discussed IndyGo's curb to curb paratransit service, Open Door.

Senator Miller then invited Greg Meyer, citizen and former member of IndyGo's Mobility Advisory Committee, to speak to the committee. Mr. Meyer spoke about his personal preference to ride IndyGo's fixed route service rather than the Open Door service. He also discussed the difficulty of not living near the fixed routes.

Ms. Laycock resumed testimony on behalf of ICAT. She stated that MIBOR supports an expanded transit service because it enhances quality of life and raises property values.

Ms. Lyle testified that 90% of AARP Indiana's members want to age in place, but face challenges due to the lack of transportation infrastructure.

Ms. Weidman shared her perspective as a young professional and described regional transit as an opportunity to improve the future of Indianapolis.

**VIII. Nicholas Donohue, Policy Director, Transportation4America**

Mr. Donohue spoke about transit at the national level, citing cities such as Charlotte, Cleveland, and Salt Lake City as success stories. See Exhibit F. He agreed to provide

Senator Waltz information related to transit oriented development in Salt Lake City. Mr. Donohue and Representative Pryor discussed the use of various tax strategies in transit oriented development. Senator Breaux mentioned the risks of relying on federal funding as a dedicated revenue source. Senator Kenley questioned whether transit users should pay for all transit costs at the farebox. Mr. Donohue characterized all transportation as an investment in the future of a community.

**IX. Mike Rosiello, Board Member and Public Policy Subcommittee Chairman, United Way of Central Indiana (UWCI)**

Mr. Rosiello expressed UWCI's support for a public mass transportation system in central Indiana, stating that it is crucial from a human services perspective. See Exhibit G. Senator Breaux mentioned that there are public services, such as roads, for which the working poor are taxed, but may not use due to not owning a car. Representative DeLaney stated that unreliable personal transportation is a problem for the working poor. Representative Porter emphasized the difficulty faced by individuals who live far away from where they work.

**X. Michael Terry, President and Chief Executive Officer, IndyGo (Indianapolis Public Transportation Corporation)**

Mr. Terry spoke about IndyGo's current budget and service levels as well as its future needs, specifically a funding source. See Exhibit H. Senator Miller asked how IndyGo would need to change and grow to meet the demands of the proposed Indy Connect plan. Mr. Terry stated that IndyGo would need to double its number of buses and hours of service as well as increase the frequency of routes. Senator Lanane, Representative DeLaney, and Mr. Terry discussed strategies to expand and improve services. Senator Breaux confirmed that IndyGo partners with the Indianapolis MPO, and Mr. Terry offered to provide details of the relationship. Senator Crider asked Mr. Terry how to best explain to constituents the cost per capita of implementing a regional transit plan.

**XI. Adjournment**

Senator Miller reminded committee members that the third and fourth meetings are scheduled for October 3 and October 31, respectively. The meeting adjourned at 1:41 p.m.

**A Statement to the Central Indiana Transit Study Committee in Support of Better Public Transportation for Indianapolis and Central Indiana- September 10, 2013**

My name is Roger Hollands and I am a retired professor of Political Science at Ball State University. I represent the Anderson-Muncie Public Transportation Coalition and strongly support the Indy-Connect plans for improved funding for public transportation in Indianapolis and Central Indiana. AMPTC is an advocacy and educational group supporting better funding for public transit. Since 2011, LifeStream Services has been our comprehensive fiscal sponsor. AMPTC also works closely with the Indiana Citizens Alliance for Transit.

Good public transit systems and public transportation alternatives are needed now more than ever in East Central Indiana and within the large and growing Indianapolis area. The Indianapolis-Carmel metropolitan statistical area includes eleven counties and more than 1.7 million people. If Bartholomew County (Columbus), Delaware County (Muncie) and Monroe County (Bloomington) are added, the total population exceeds 2.1 million. More and more of our citizens commute to work significant distances within their own counties and often many miles to places of employment all across the region.

To illustrate the importance of commuting in Central Indiana, here are a few examples. There are a total of over 496,000 workers who live in Indianapolis-Marion County alone and commute throughout that county. Commuters from Marion County working in other counties and those living elsewhere but commuting into Marion County total another 220, 900 based on Indiana IT-40 Returns for Tax Year 2011 (the most recent data available). In Madison County, 63,664 persons live and work in that county while 23,847 individuals commute into or out of Madison County each weekday. Of these, 6681 persons commute daily between Madison County and Marion County while the same number of commuters travel daily between Madison County and Hamilton County. A total of 3624 persons commute between Delaware and Madison Counties. In Delaware County, the same 2011 statistics showed 60,836 workers living and working in the county while 15,803 workers commute into or out of that county each weekday. Each weekday 1409 of these commuters travel between Delaware and Marion counties while 1011 commuters travel between Delaware and Hamilton Counties. (http://www.stats.indiana.edu/dms4/commuting.asp)

Commuters from Delaware and Madison Counties need an effective well- funded public transit system in the core metropolitan area that provides frequent service to help them get around in Indianapolis whether they use a carpool, van pool or take express commuter buses to Indianapolis. Similarly, daily commuters coming from Indianapolis/Marion County and from Hamilton County to Muncie and Anderson will benefit from a strong transit system.

While our region will always be dependent on automobiles, increasing congestion on the roads, costs of driving and growing air pollution are all concerns of those who want a more balanced transportation network. An enhanced public transportation system providing well-funded, fully accessible transit is a much needed component of such a

CITS
9/10/13
Ex. A

network. Such networking will enhance critical connectivity for people and businesses and offer a range of better transportation choices for all.

**Public transit planning needs to include consideration of the following components:**

Frequent bus and future light rail transit service in cities and urban areas. Express bus service and bus rapid transit are also being developed in other cities.

On-Demand transit service in suburban and rural areas. – examples include LifeStream's New InterUrban and Hamilton County Express

Commuter buses to and from suburban residential areas and smaller cities to the central business district of Indianapolis- examples include commuter buses from Fishers, Carmel and Plainfield.

Intercity commuter bus service at an affordable cost- Future service might include frequent service between Anderson, Muncie and Indianapolis. Commuter buses could also carry passengers from Kokomo, Columbus and Bloomington to Indianapolis.

Possible commuter rail service from regional cities to and from Indianapolis. The South Shore provides this service on the route from South Bend to Chicago.

Carpooling and vanpool coordination and support services – This is provided currently through the Central Indiana Regional Transportation Authority (CIRTA).

Park and Ride Lots – Lots are needed and could be funded in cooperation with local governments and the Indiana Department of Transportation.

Throughout Central Indiana, health and quality of life will be enhanced by linking improved transit with more walkable communities, additional bicycle trails and streets with clearly marked bicycle lanes.

Good public transportation is an investment for the future that will pay dividends by easing traffic congestion and reducing costly delays. It is essential for those who can't drive. It will also help in attracting and retaining a technically trained and educated workforce including young professionals who are more likely to choose places to live based on quality of life factors, including accessibility to public transit. Public transportation will provide personal mobility options and freedom for people from every walk of life. Most important it will provide choices for young people, people with disabilities and persons of all ages who want balanced public transportation that will move Central Indiana to the forefront of metropolitan areas.

Roger G. Hollands
Anderson-Muncie Public Transportation Coalition (AMPTC)
A Mission of LifeStream Services


## Indianapolis Metropolitan Planning Organization

**Anna Gremling (Tyszkiewicz),** Executive Director
**Sean Northup,** Assistant Executive Director

# MAIN MESSAGES

- **Indy Metropolitan Planning Organization (MPO):** Central Indiana's federally-designated transportation planning body
- **Indianapolis Regional Transportation Council (IRTC):** The MPO's governing board, made up of the chief elected officials from each of the 34 cities, towns, and counties in the region
- **Core Functions:** Long-range planning, federal grant management, project management
- **Indy Connect:** Central Indiana's transit plan
- **New Starts:** The Federal Transit Administration's competitive capital investment funding program

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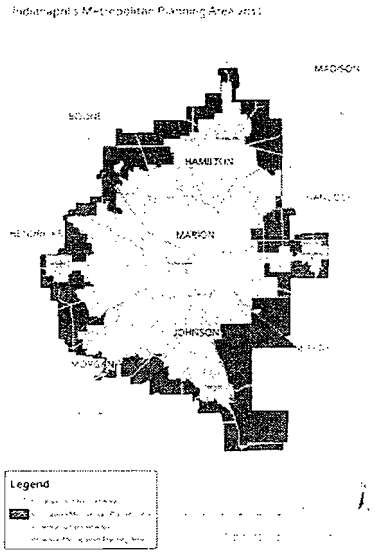
Ex. B

# THE INDIANAPOLIS MPO




## Metropolitan Planning Area

- 8 counties
- 30 cities and towns
- 1.4 million residents (22% of Indiana)
- 1,520 sq. mi. (4% of Indiana)

## Federal Funding Programs

| | |
|---|---|
| $28.8M | Surface Transportation (STP) |
| $5.4M | Safety (HSIP) |
| $7.8M | Congestion/Air Quality (CMAQ) |
| $2.4M | Transportation Alternatives (TAP) |
| $1.6M | Planning Funds (PL) |

# INDIANAPOLIS REGIONAL TRANSPORTATION COUNCIL

### Voting Members

Avon: Tom Klein, Town Manager
Boone County: Marc Applegate, County Commissioner
Carmel: James Brainard, Mayor
Danville : Gary Eakin, Town Manager
Greenfield: Karla Vincent, City Engineer
Hancock County: Town Stevens, County Commissioner
Johnson County: Luke Mastin, Director of Highway Department
Mooresville: Mark Mathis
Noblesville: John Ditslear, Mayor
Shelby County: Sam Booth, Planning Commission Director
Westfield Andy Cook, Mayor
Zionsville: Elizabeth Hopper, Town Council
Central Indiana Regional Transportation Authority: Andrew McGee, Commuter Connect Manager
Bargersville: Kevin Killinger, Utilities Coordinator
Brooklyn: Karen Howard, Clerk-Treasurer
Cicero: Paul Munoz, Planning Director
Fishers: Scott Fadness, Town Manager
Greenwood: Mark Myers, Mayor
Hendricks County: Matthew Whetstone, County Commissioner
Lawrence: Dean Jessup, Mayor
Morgan County: Don Adams, County Commissioner
Pittsboro: Jason Love, Town Supervisor
Southport: Jesse Testruth, Mayor
Whiteland. Dennis Cappozi, Town Manager
Indianapolis Public Transportation Corporation: Mike Terry, President and CEO
Indiana Department of Transportation: Brandye Hendrickson, District Deputy Commissioner
Beech Grove:Dennis Buckley, Mayor
Brownsburg. Grant Kleinhenz, Town Manager
Cumberland: Andrew Klinger, Town Manager
Franklin: Joe McGuiness, Mayor
Hamilton County. Christine Altman, County Commissioner
Indianapolis: Greg Ballard, Mayor
McCordsville: Tonya Galbraith, Town Manager
New Palestine: Larry Jonas, Town Council
Plainfield: Rich Carlucci, Town Manager
Speedway: Barbara Lawrence, Town Manager
Whitestown: Jason Lawson, Utility Manager
Indianapolis Airport Authority: Greta Hawvermale, Director of Planning
Ports of Indiana Jody Peacock

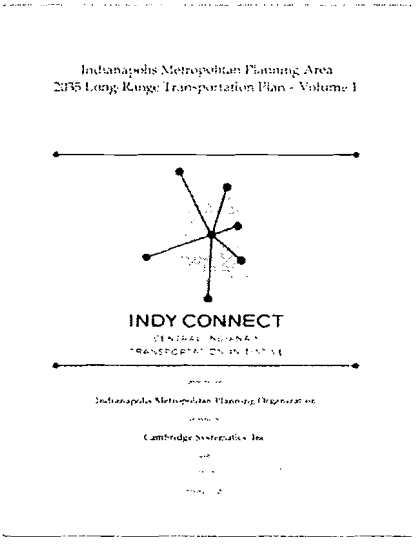
### Non-Voting Members

Federal Highway Administration
Federal Transit Administration
Environmental Protection Agency
Indiana Department of Environmental Management

# CORE FUNCTIONS

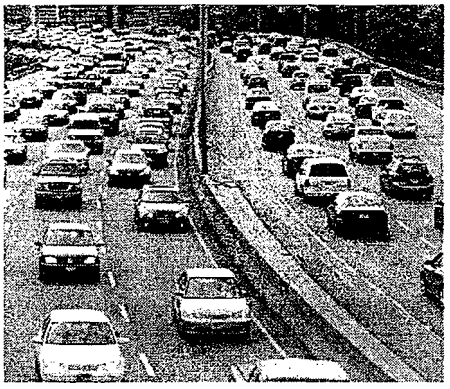
- Long range transportation plan
- Air Quality Conformity
- Transportation Improvement Program
- Regional Travel Demand Model
- Grant Management
- Other Responsibilities

# LONG-RANGE TRANSPORTATION PLAN (LRTP)




- Federally required long range planning document
- 25 year planning horizon
- Cost constrained plan looks at long term revenues and project-specific expenses
- Must account for current air quality conformity standards
- Indy Connect Plan adopted into LRTP in 2010

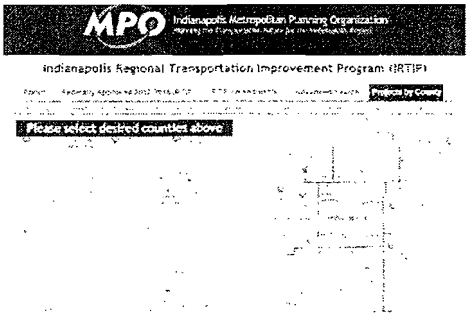
# AIR QUALITY CONFORMITY



- MPO is responsible for tracking regional compliance of Indiana Department of Environmental Management / Environmental Protection Agency standards for PM 2.5, $SO_2$, and (formerly) Ozone
- Central Indiana air quality conformity levels are currently:

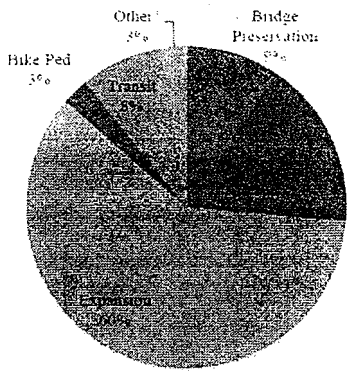
| | |
|---|---|
| Ozone | Attainment |
| PM 2.5 | Maintenance |
| $SO_2$ | Non-Attainment |

# TRANSPORTATION IMPROVEMENT PROGRAM (TIP)

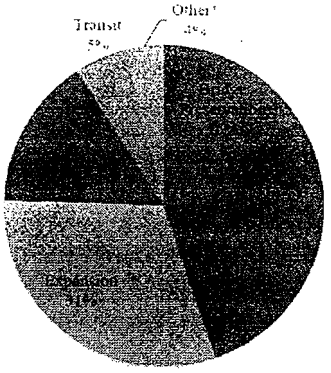



- The region's official list of *funded* near-term transportation projects
- Current TIP includes projects through 2015; projects through 2017 have been selected but not officially adopted by IRTC
- Lists specific projects, costs, and funding categories (Surface Transportation, Congestion Mitigation & Air Quality, Health Safety Improvement, Transportation Alternatives)
- MPO's online project tracking interface (called *MiTIP*) recently launched and is open to the public

## Projects are selected by committees of staff and board members using criteria approved by INDOT and the Federal Highway Administration.

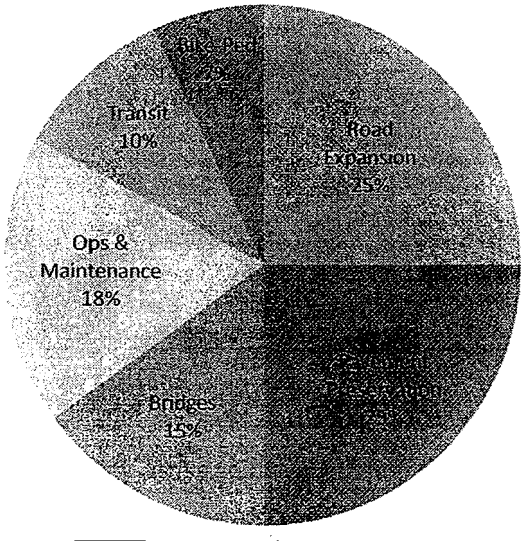



All Transportation Improvement Program Funds in FY 2012-2015

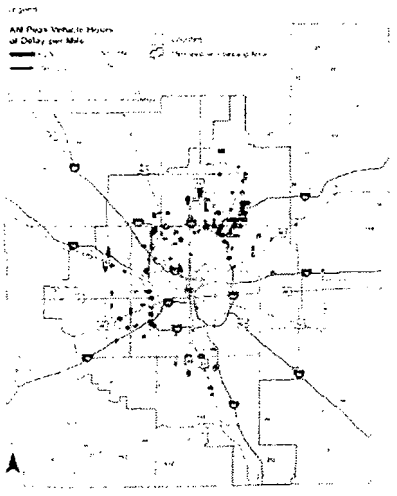



MPO-Managed Transportation Improvement Program Funds in FY 2012-2015

## During the latest Long Range Transportation Plan update, the IRTC set more balanced transportation funding priorities for Central Indiana.



# REGIONAL TRANSPORTATION DEMAND MODEL



- Federally required transportation planning tool
- Helps predict air quality and traffic impacts of transportation improvements
- MPO is in the process of calibrating a state-of-the art model that is being used for:
  - hot spot analysis
  - regional air quality conformity
  - traffic congestion impacts
  - transit ridership estimates

# GRANT MANAGEMENT

- Federal Railroad Administration (FRA) and Federal Transit Administration (FTA) grants are managed by MPO staff
- Example FRA Grant: Indianapolis Belt Railroad Study
  - To look at freight relocation from main line
  - Working with INDOT, CSX, Amtrak, City of Indianapolis
- Example FTA Grant: Central Corridors Transit Studies
  - Looking at three rapid transit corridors, as directed by the transit portion of our LRTP
  - National and local expertise; working with various municipalities

# OTHER RESPONSIBILITIES

- Regional Data Repository: Traffic Counts, Speed Data, Info USA, GIS data with IMAGIS, demographics
- Transit planning in support of IndyGo and CIRTA
  - On-board survey
  - omprehensive operations analysis
- Pedestrian and bicycle planning
- Freight Planning in support of INDOT and LPAs

## The MPO directed or participated in several transit studies prior to Indy Connect.

DIRECTIONS

northeast corridor transportation CONNECTIONS linking our region's opportunities

Our past. Our possibilities.

Comprehensive Operational Analysis

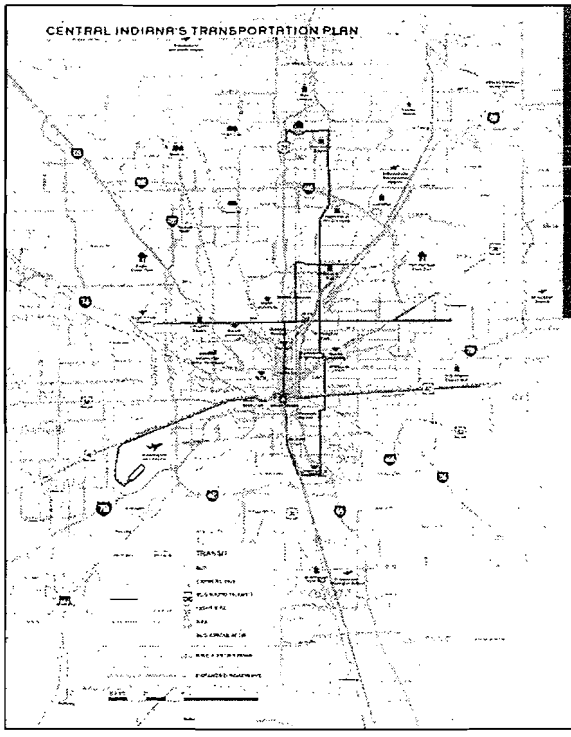
Blue Ribbon Commission

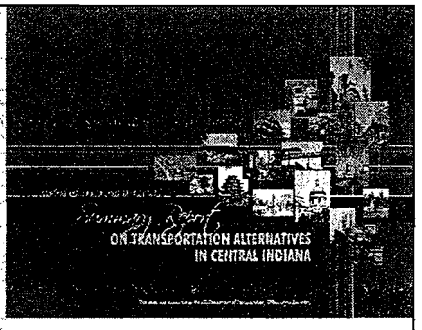
CICF
CENTRAL INDIANA COMMUNITY FOUNDATION

CICP

MIBOR

Indianapolis




Regional Transportation Plan

Multi-Modal (new roads, tolled express lanes, bikes, trails, HOV lanes, local busses, express busses, and both light and commuter rail)

Found transit feasible and recommended priority projects

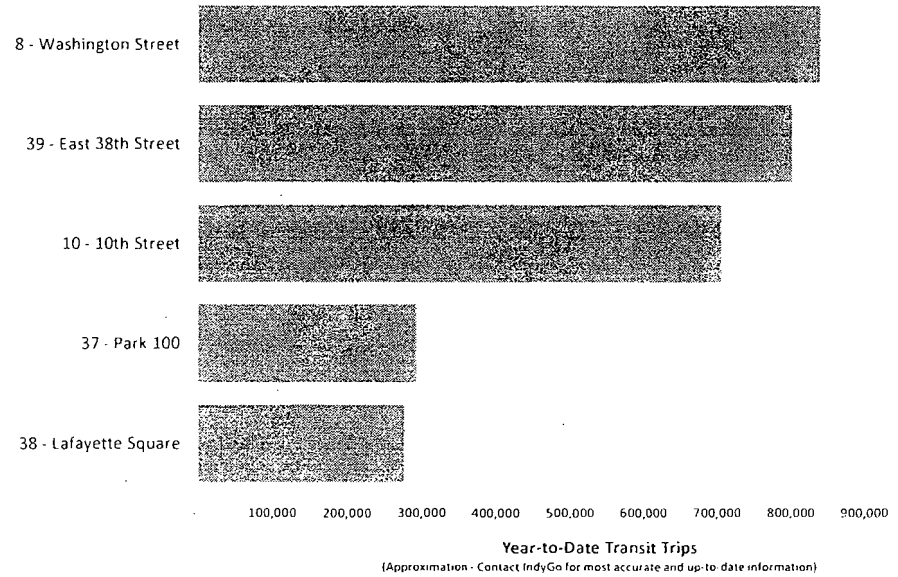
Made financing and governance recommendations

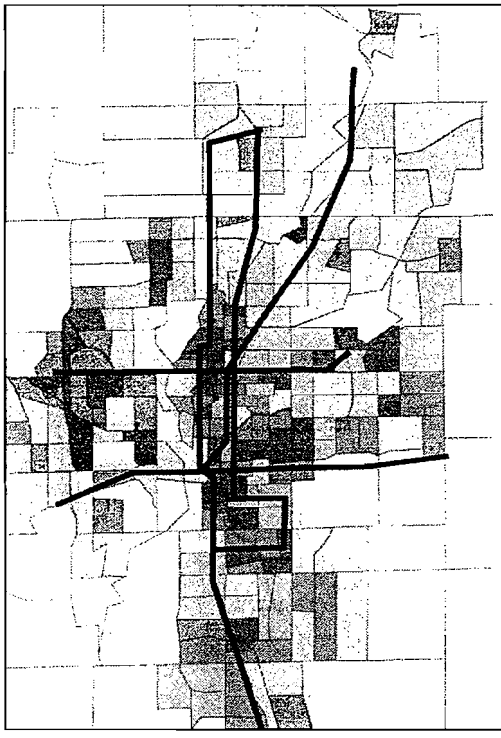
# INDY CONNECT

CENTRAL INDIANA'S
TRANSPORTATION INITIATIVE

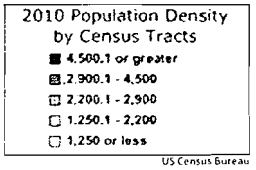
CIRTA IndyGo MPO

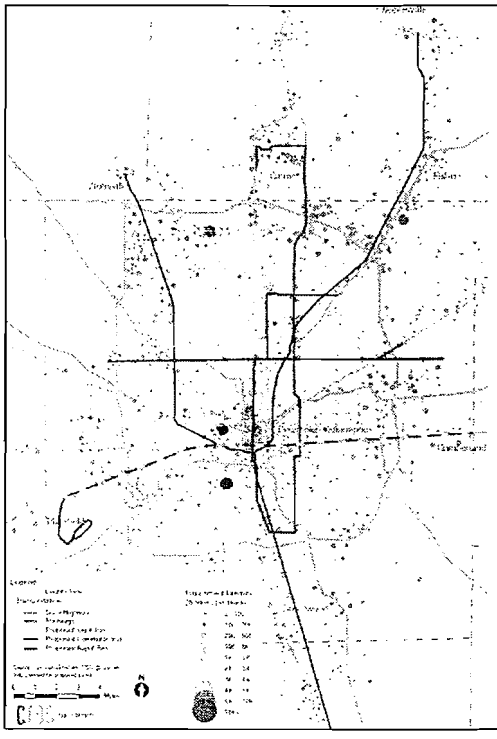
## Like most transit studies, we started with the busiest IndyGo routes.





## Transportation and land use are linked, so planners looked at current and future population densities.

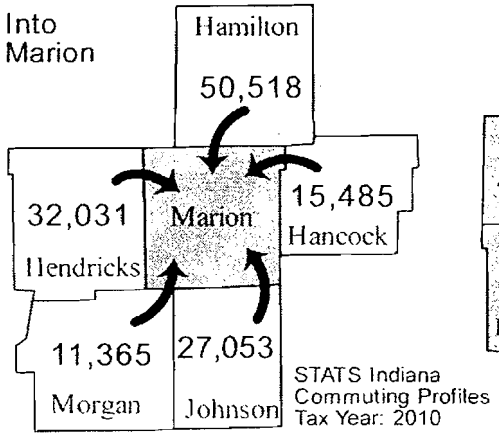


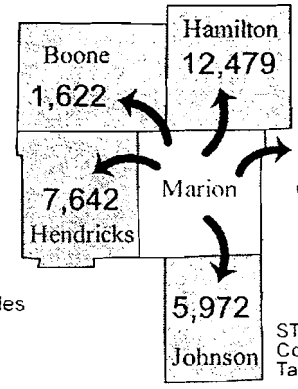
## Most importantly, planners worked to connect employment centers.

Job centers and the Central Indiana Task Force Plan – a previous version of the regional transit plan.

## We looked broadly at where commuters were coming from, and where they were going…



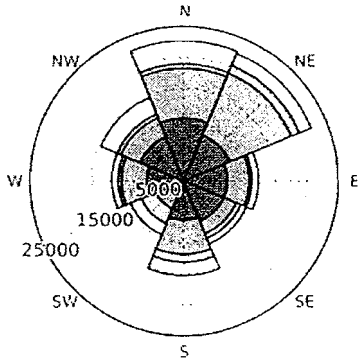

STATS Indiana Commuting Profiles Tax Year: 2010



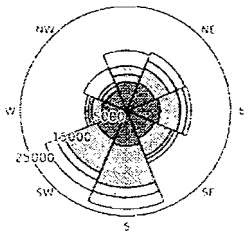

STATS Indiana Commuting Profiles Tax Year: 2010

## Then more specifically at the direction commuters come from and the distance they travel.

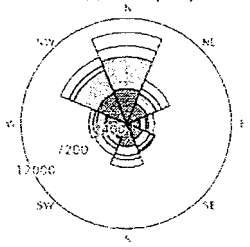
Downtown Indianapolis Commuters by Distance and Direction (2011)




Hamilton County Commuters by Distance and Direction (2011)



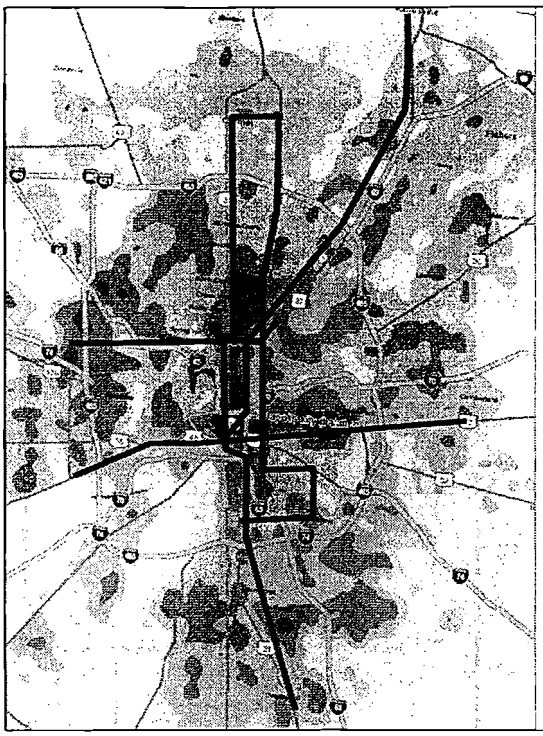
Johnson County Commuters by Distance and Direction (2011)



Downtown Indianapolis Jobs by Distance

| | 2011 Count | Share |
|---|---|---|
| Total All Jobs | 119,051 | 100.0% |
| Less than 10 miles | 54,706 | 45.9% |
| 10 to 24 miles | 40,212 | 33.8% |
| 25 to 50 miles | 8,447 | 7.1% |
| Greater than 50 miles | 15,686 | 13.2% |

US Census Bureau - On the Map

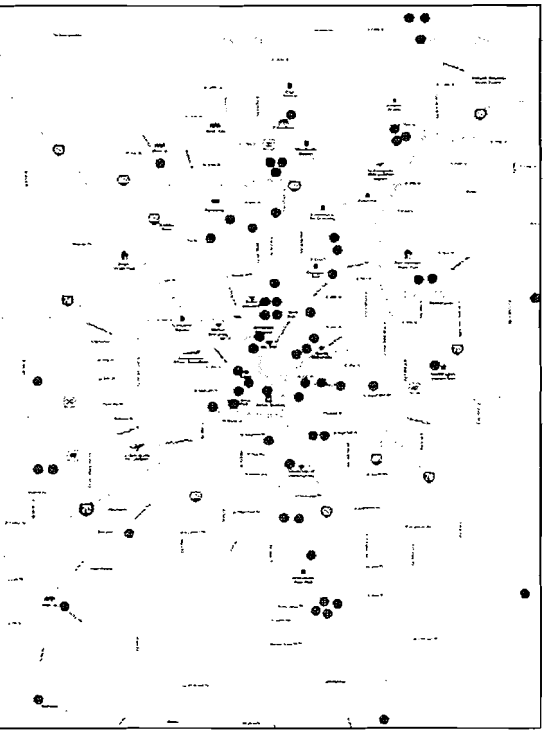


**Using specialized tools like the travel demand model, planners studied specific regional origins and destinations.**

Where downtown workers live,
US Census Bureau, *On the Map*

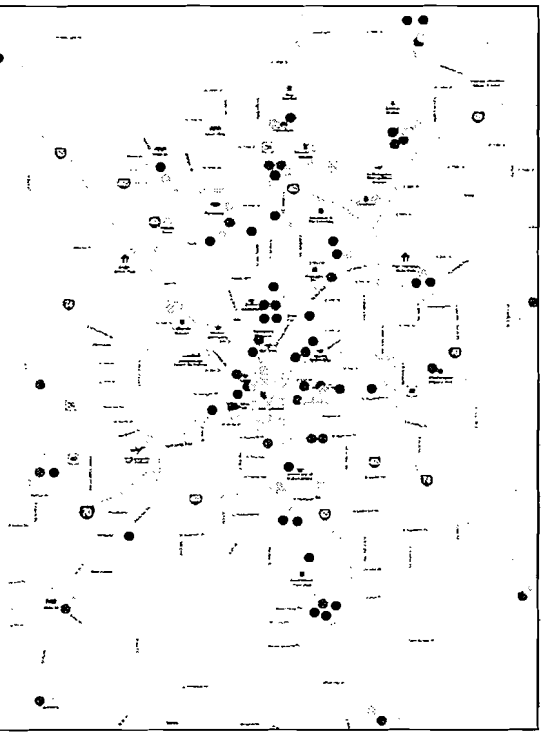
**Beginning in 2010, the Indy Connect team began an unprecedented, award-winning public engagement process that continues today.**

Public Meetings & Open Houses



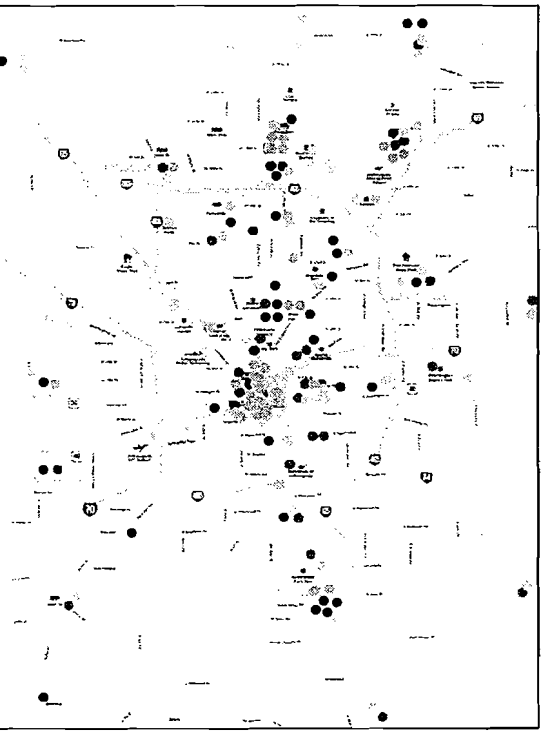
Over 60 formal public meetings and open houses, hundreds of presentations to various groups...

Public Meetings & Open Houses
Presentations for Groups & Organizations



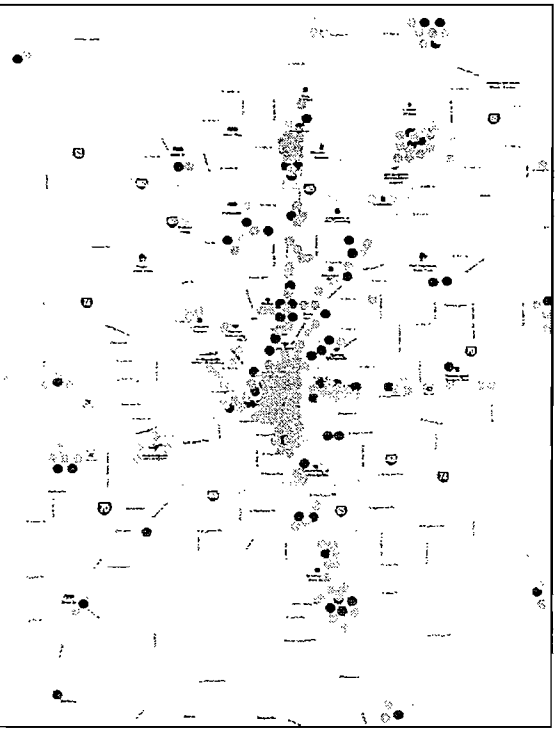
Booths at festivals, conferences, and community events, and three citizen advisory commissions.

Public Meetings & Open Houses
Presentations for Groups & Organizations
Fairs & Festivals



**And ongoing update and input meetings with stakeholders across the region, including business and community leaders, as well as local elected officials.**

Public Meetings & Open Houses
Presentations for Groups & Organizations
Fairs & Festivals
Stakeholder Meetings



## MEDIA COVERAGE

250+ public meetings across the region during the day and in the evening

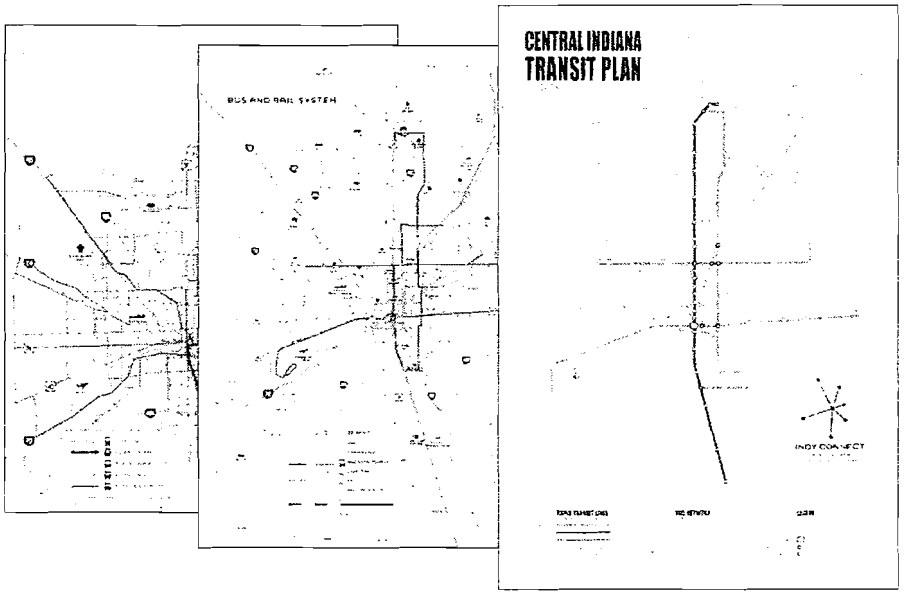
10,000+ public comments collected, 80,000 website visits

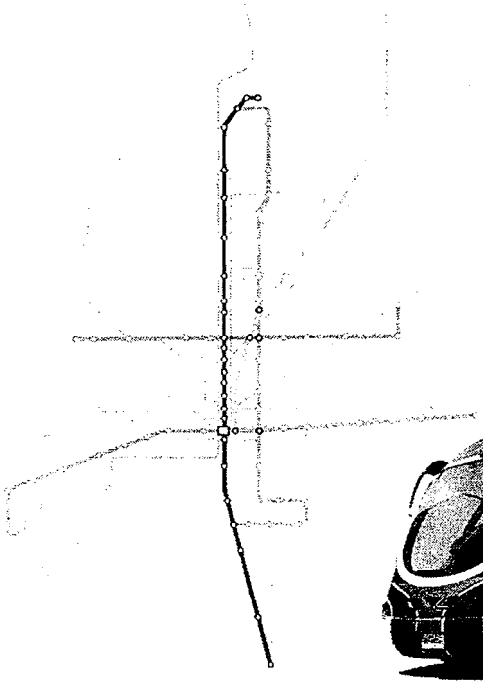
State Fair presence; brought in a Cleveland Health Line vehicle

Corridor / Minority / Downtown focus groups

Recognized by Federal Highway and Federal Transit as a national best practice for public engagement; emulated by planning and infrastructure initiatives nationally

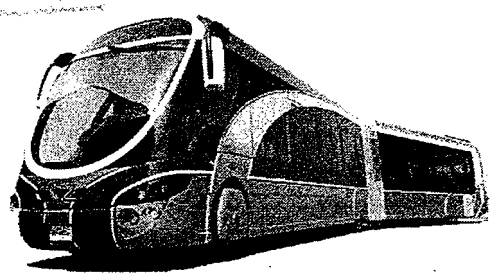
## The plan was reviewed, vetted, adjusted, and revised by more than 10,000 public comments.

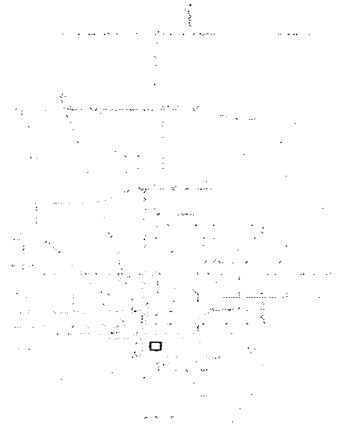




## PHASE I: HAMILTON & MARION COUNTIES IN 10 YEARS

- Doubles local bus service
- Express bus between counties
- Circulator routes within communities
- 5 rapid transit lines



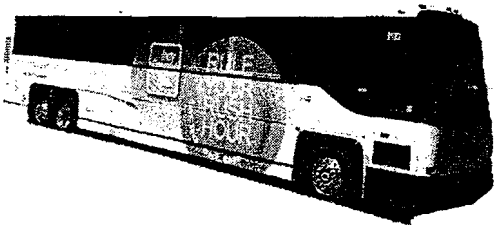


## Double Local Bus Service

- New service to Hamilton and Johnson Counties
- More cross-town routes = Fewer transfers
- More frequent service (every 15 minutes) = Less waiting, easier transfers
- Longer hours of service
- Better weekend service

## Express Bus and Community Circulators

- Express bus between counties
- Express bus to key destinations within the county
- Circulators within cities and communities



## Five Rapid Transit Lines

RED

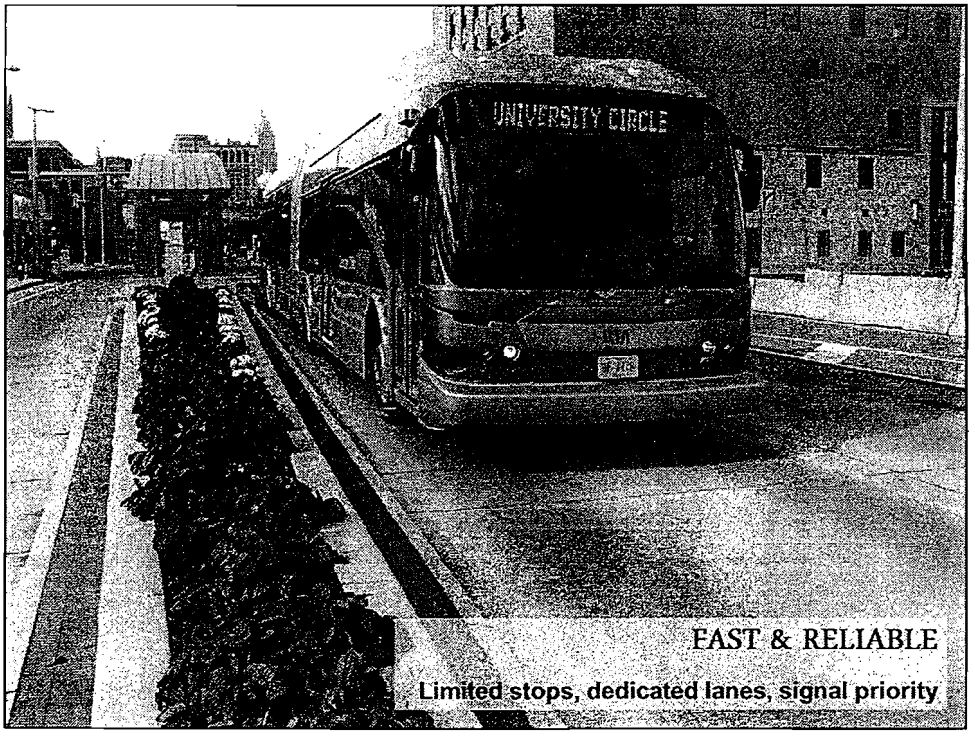
BLUE

GREEN

ORANGE

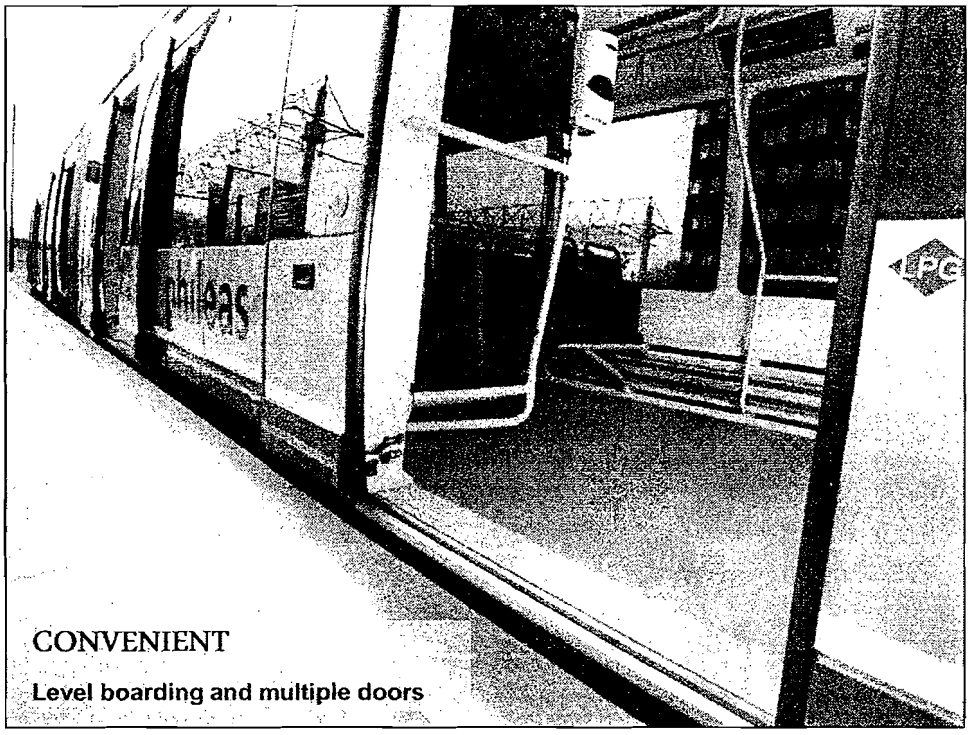
PURPLE

# WHICH ONE IS LIGHT RAIL?




FAST & RELIABLE

Limited stops, dedicated lanes, signal priority

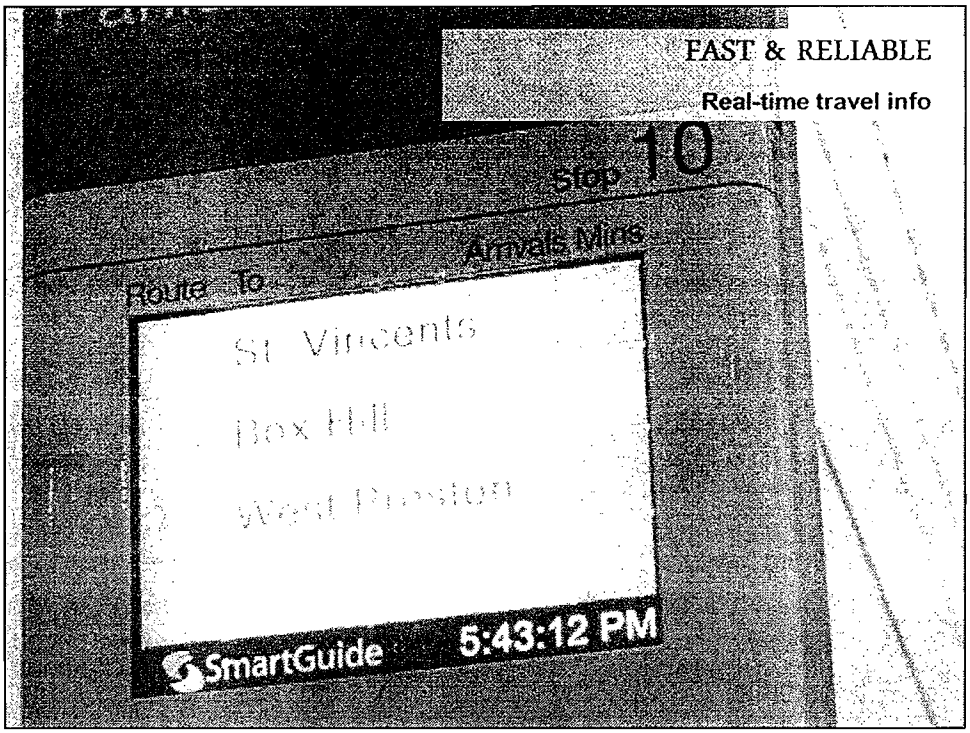


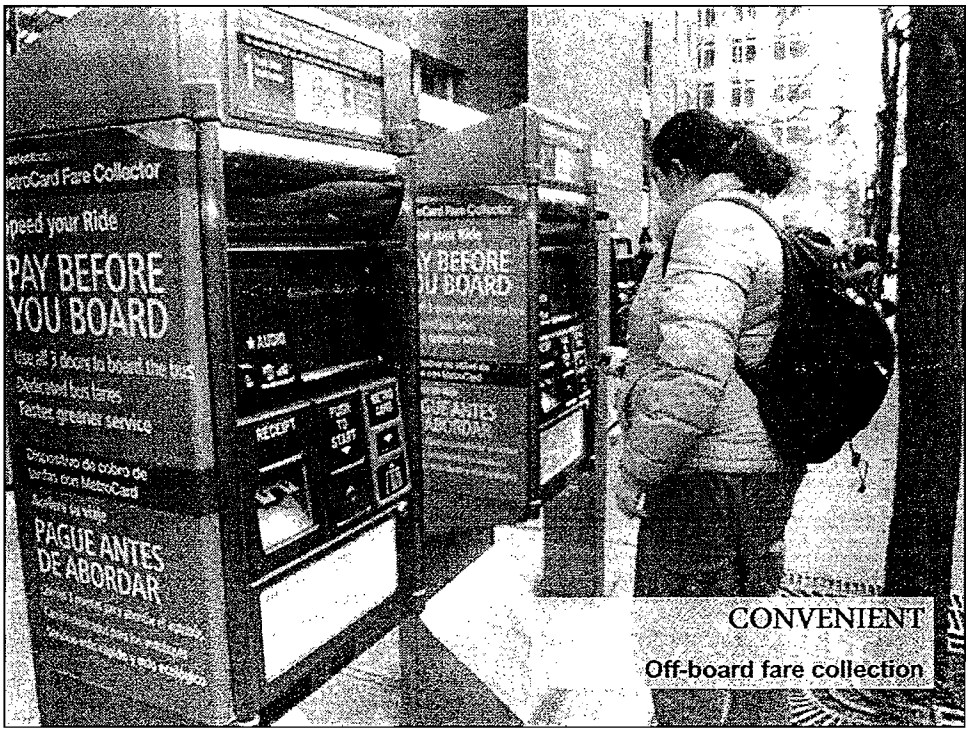

CONVENIENT

**Level boarding and multiple doors**

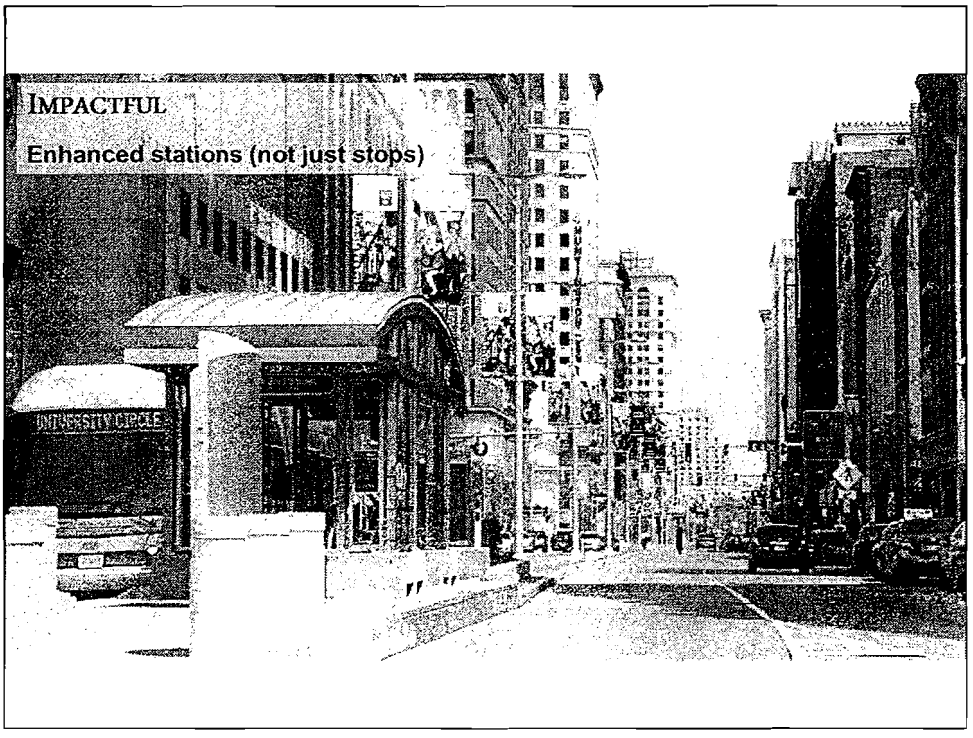
CONVENIENT

**Bike, stroller, & ADA accessible**


FAST & RELIABLE
Real-time travel info
Stop 10
Arrivals Mins
Route To
St Vincents
Box Hill
SmartGuide
5:43:12 PM


MetroCard Fare Collector
Speed your Ride
PAY BEFORE YOU BOARD
PAGUE ANTES DE ABORDAR
CONVENIENT
Off-board fare collection


MODERN & COMFORTABLE
Amenities like Wi-Fi, bike racks, & benches


IMPACTFUL
Enhanced stations (not just stops)


IMPACTFUL
BIG development potential


BRANDED SERVICE,
ENHANCED VEHICLES
Take advantage of Indiana companies & innovation
Cummins
Allison

| Vendor | Name | City | Prod/ST |
|---|---|---|---|
| P026725 | ADCO PRODUCTS | EVANSVILLE | IN |
| P043221 | ALLISON TRANSMISSION | INDIANAPOLIS | IN |
| P043222 | ALLISON TRANSMISSION | INDIANAPOLIS | IN |
| P066645 | AMSAFE | ELKHART | IN |
| P073580 | APEX TOOL COMPANY | COLUMBUS | IN |
| P081701 | ASC INDUSTRIES | ELKHART | IN |
| P084425 | AUTO TRIM DESIGN | PARKER CITY | IN |
| P148780 | VOSS AUTOMOTIVE, INC | FORT WAYNE | IN |
| P252298 | CUMMINS ENGINE CO | COLUMBUS | IN |
| P254302 | CUSTOM RADIO CORPORATION | FORT WAYNE | IN |
| P255780 | COMMERCIAL VEHICLE SYSTEM | MICHIGAN CITY | IN |
| P269941 | FEVY INTERNATIONAL INC | PENDLETON | IN |
| P294035 | E A P SPECIALTY COMPOSITE | INDIANAPOLIS | IN |
| P303565 | HOOSIER TANK AND MFG INC | SOUTH BEND | IN |
| P310751 | FRENTONE INDUSTRIAL PROD | INDIANAPOLIS | IN |
| P360120 | GENERAL TRUCK SALES | MUNCIE | IN |
| P361953 | GROTE MFG CO | MADISON | IN |
| P427357 | TENNECO AUTOMOTIVE | ANGOLA | IN |
| P427519 | IVVI | WESTFIELD | IN |
| P520552 | METRO RAPID PROTOTYPING | NOBLESVILLE | IN |
| P538552 | MOBILE CLIMATE CONTROL | GOSHEN | IN |
| P586451 | OPTRONICS | ELKHART | IN |
| P588600 | ONSPOT OF NO AMERICA INC | NORTH VERNON | IN |
| P645272 | RAMCO ENGINEERING INC | ELKHART | IN |
| P703505 | SGI INC | INDIANAPOLIS | IN |
| P743763 | ROCORE THERMAL SYSTEMS | INDIANAPOLIS | IN |
| p761605 | TRW ROSS GEAR | LAFAYETTE | IN |
| P788617 | HADLEY PRODUCTS INC | ELKHART | IN |
| P792650 | TRU-FLEX METAL HOSE CORP | WEST LEBANON | IN |
| P830200 | VITRAN EXPRESS | INDIANAPOLIS | IN |
| P902284 | HADLEY PRODUCTS INC | ELKHART | IN |
| P905550 | VISTA MANUFACTURING | ELKHART | IN |

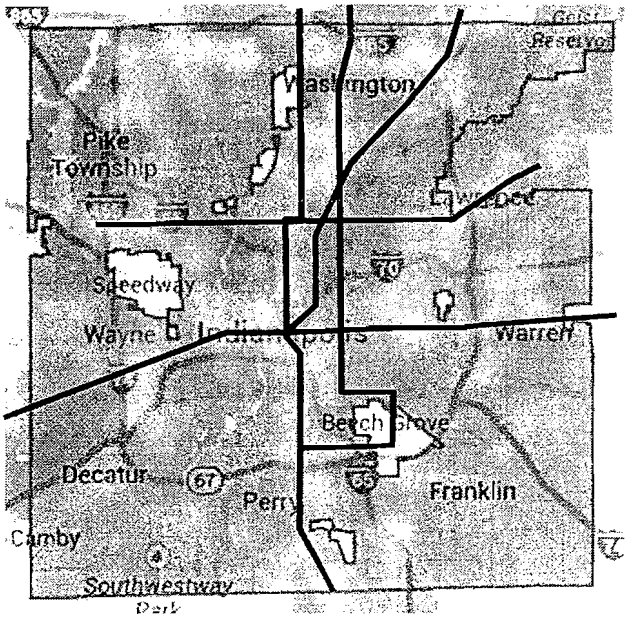
## Dozens of other Indiana manufacturers provide parts to large transit vehicle manufacturers.

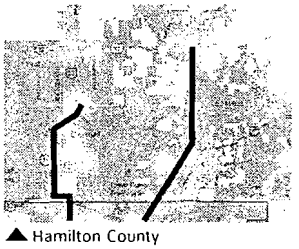
GILLIG CORPORATION

NABI

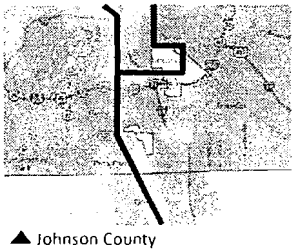
NOVABUS

## The plan connects the region's activity centers.



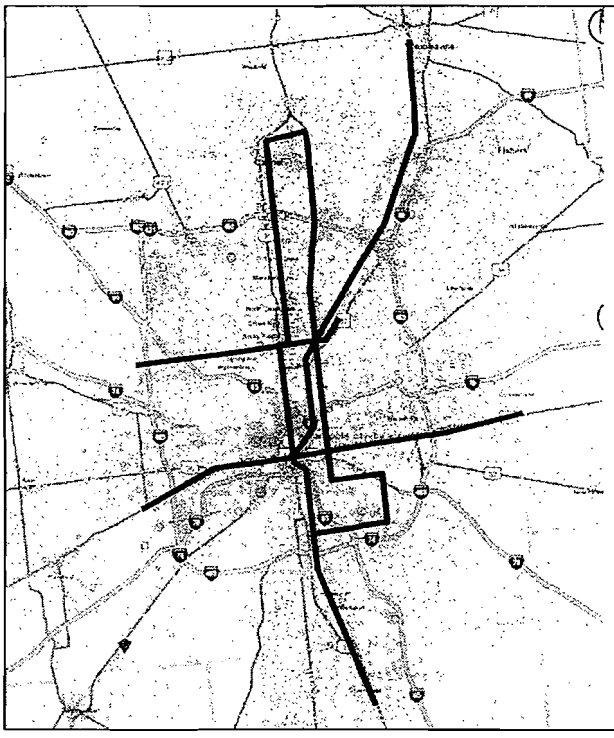



▲ Hamilton County



▲ Johnson County

◀ Marion County



## And the rapid transit corridors connect Central Indiana's major employment centers.

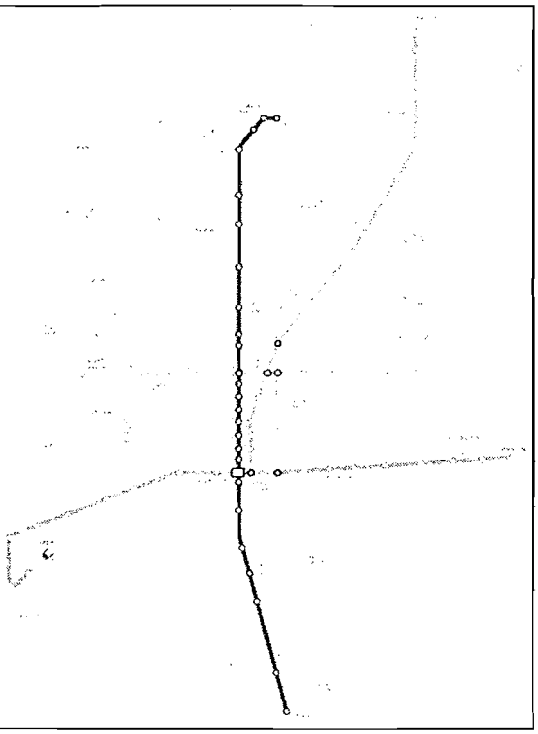
| | Pop/Sq Mi | Employ/Sq Mi |
|---|---|---|
| Region-Wide | 453 | 230 |
| Downtown | 3,286 | 31,098 |
| Red Line | 3,333 | 14,729 |
| Green Line | 2,630 | 17,285 |
| Blue Line | 3,187 | 9,004 |

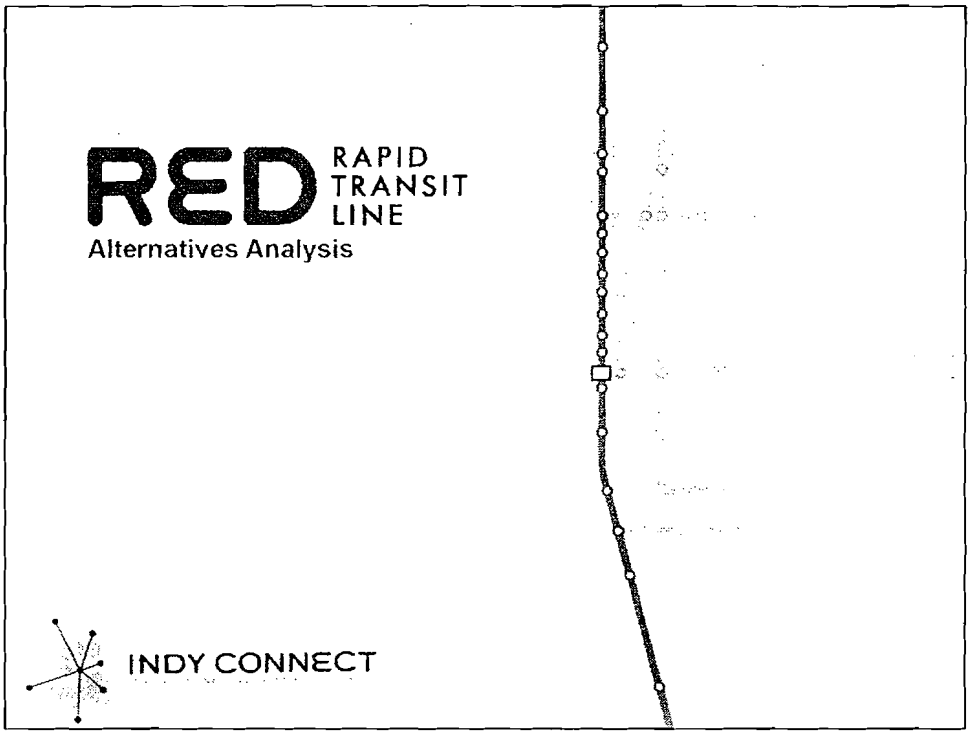
US Census Bureau; Refer to handout for coverage statistics

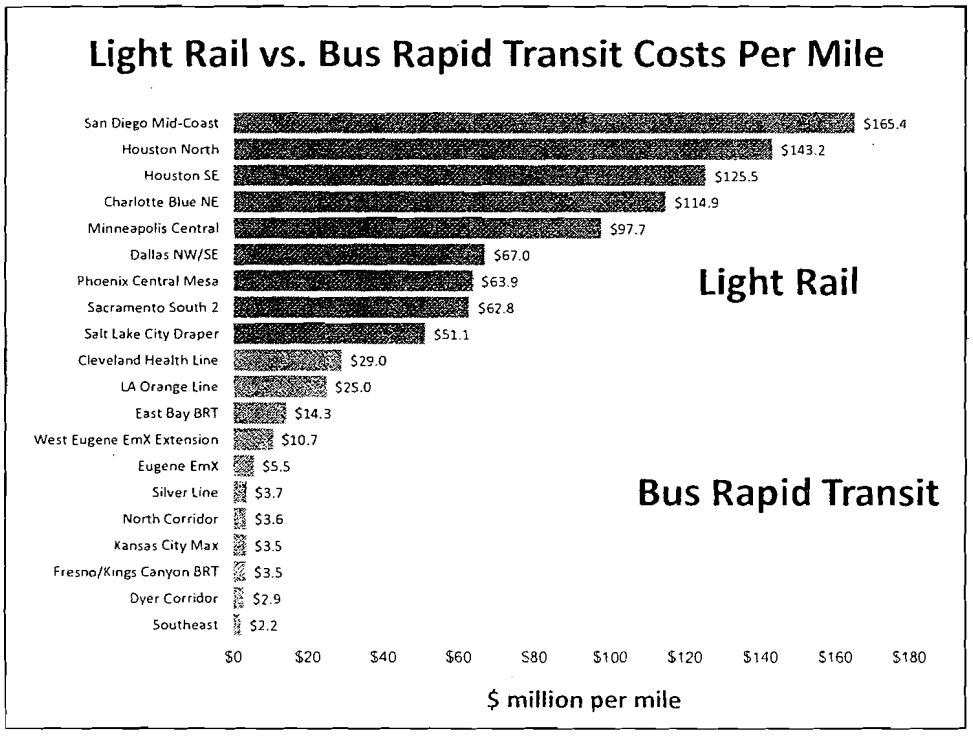
**RED** RAPID TRANSIT LINE
Carmel | Downtown | Greenwood

**BLUE** RAPID TRANSIT LINE
Plainfield/Airport | Downtown | Cumberland

**GREEN** RAPID TRANSIT LINE
Downtown | Noblesville




RED
RAPID
TRANSIT
LINE
Alternatives Analysis
INDY CONNECT


Light Rail vs. Bus Rapid Transit Costs Per Mile
San Diego Mid-Coast $165.4
Houston North $143.2
Houston SE $125.5
Charlotte Blue NE $114.9
Minneapolis Central $97.7
Dallas NW/SE $67.0
Phoenix Central Mesa $63.9
Sacramento South 2 $62.8
Salt Lake City Draper $51.1
Cleveland Health Line $29.0
LA Orange Line $25.0
East Bay BRT $14.3
West Eugene EmX Extension $10.7
Eugene EmX $5.5
Silver Line $3.7
North Corridor $3.6
Kansas City Max $3.5
Fresno/Kings Canyon BRT $3.5
Dyer Corridor $2.9
Southeast $2.2
Light Rail
Bus Rapid Transit
$0 $20 $40 $60 $80 $100 $120 $140 $160 $180
$ million per mile

## VEHICLE TYPE


RED RAPID TRANSIT LINE

51

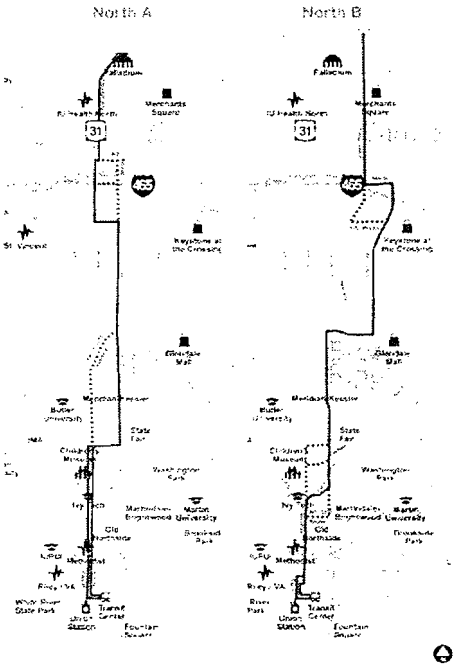
## OVERVIEW

**North-South Corridor**

- Carmel to Greenwood

**Using 38 measures narrowed from 6 to 2 to 1 alternative**

- Employment
- Low-income households
- Environmental factors
- Development potential




RED RAPID TRANSIT LINE

## OVERVIEW

**North-South Corridor**

- Carmel to Greenwood

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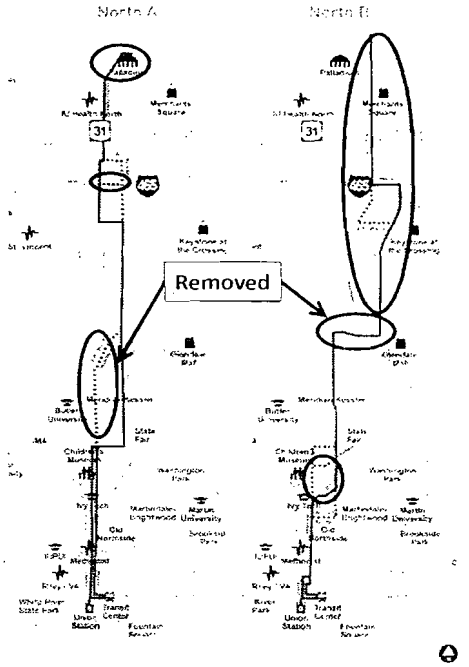



RED RAPID TRANSIT LINE

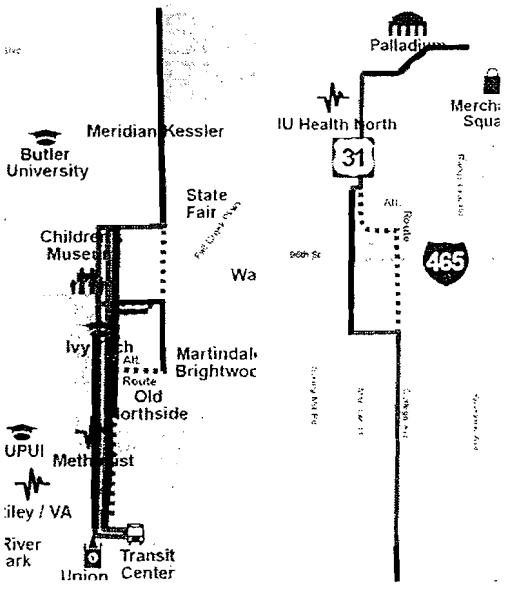
## NORTH CORRIDOR

**Transit-ways**

**Parking Lanes (Peak Period)**

**Travel Lanes**

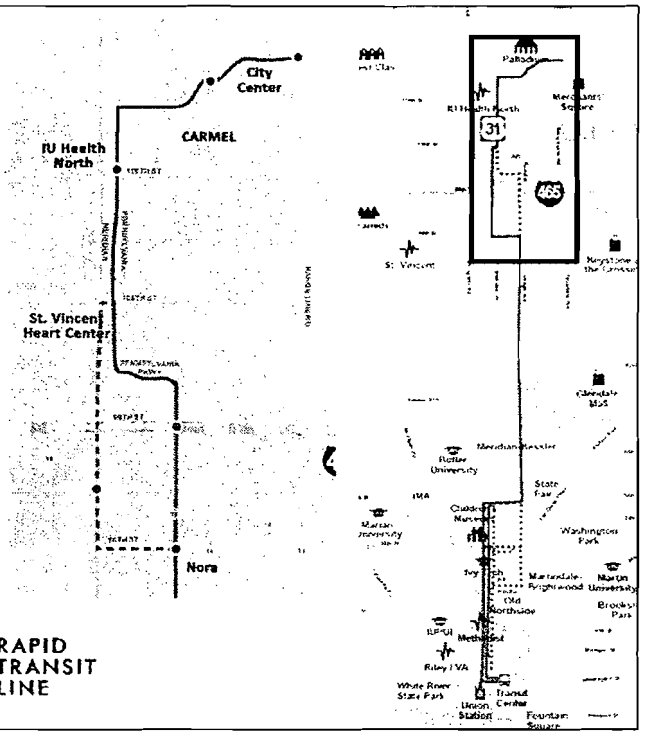
**Accel/Decel Lanes / Shoulders**




RED RAPID TRANSIT LINE

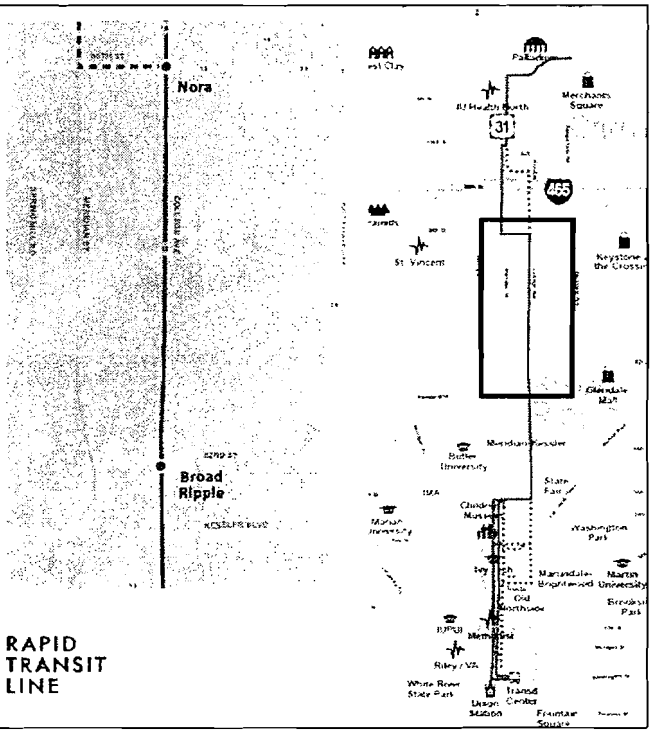
54

## STATIONS

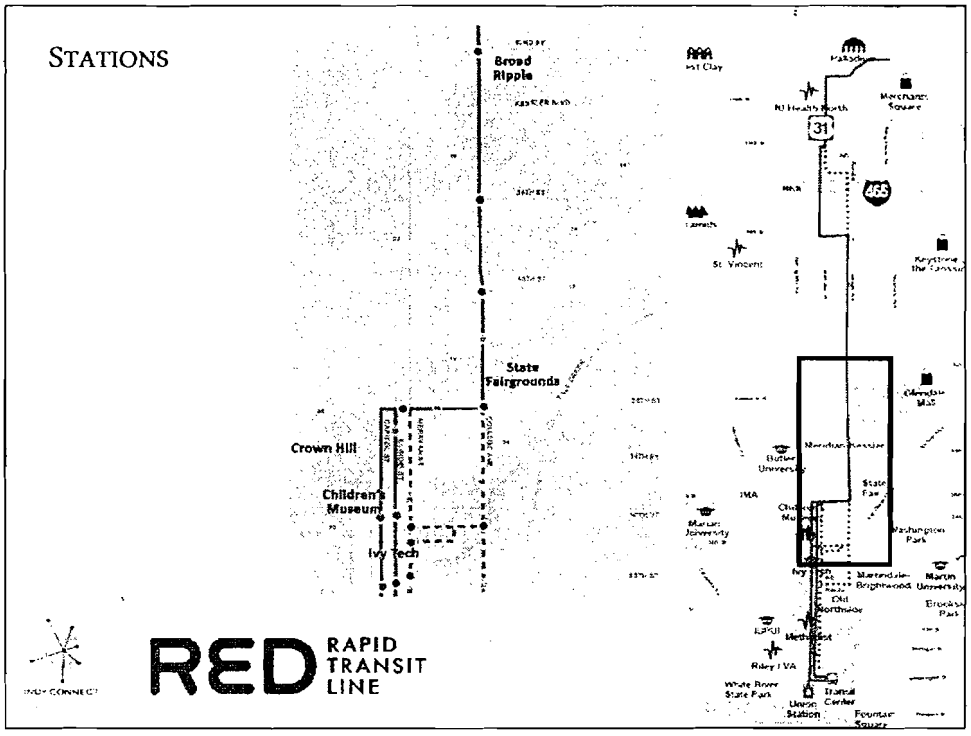


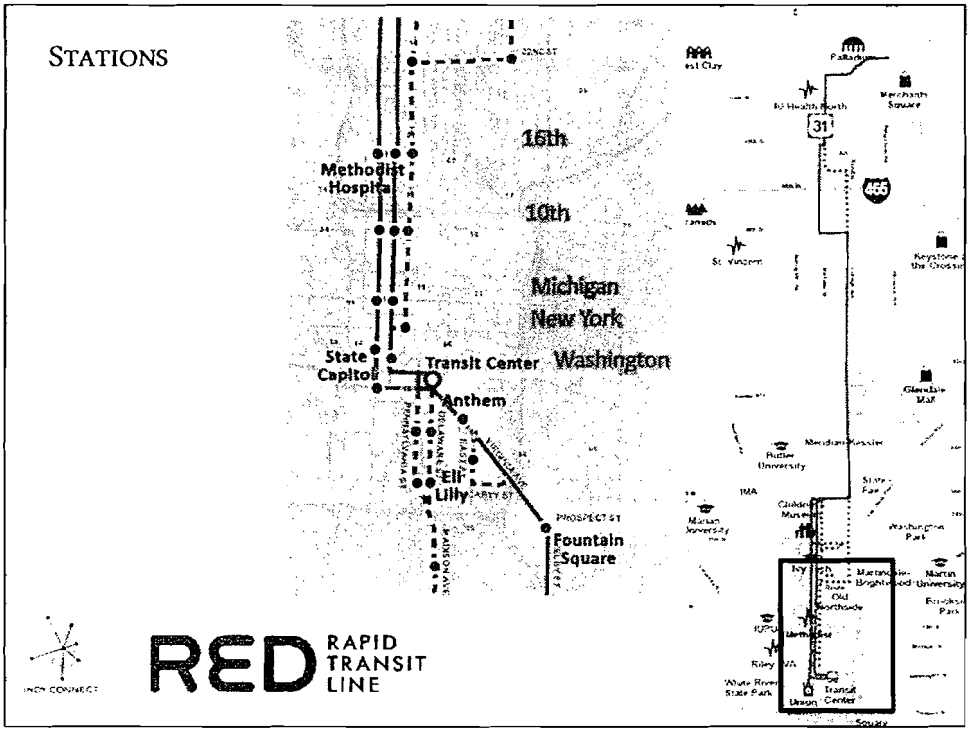

RED RAPID TRANSIT LINE

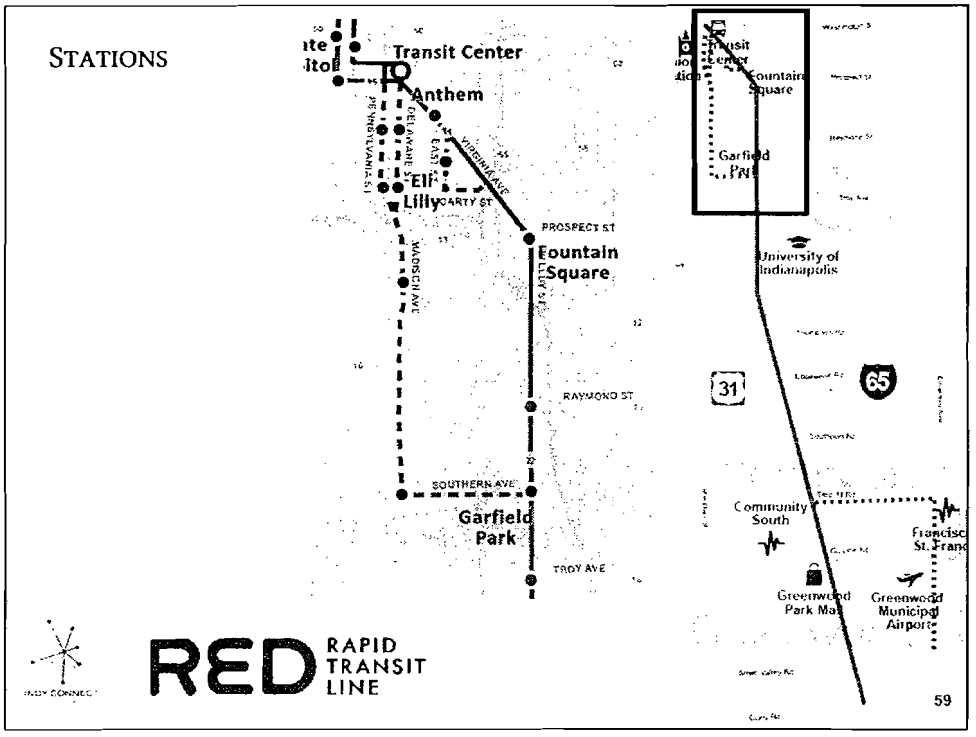
## STATIONS

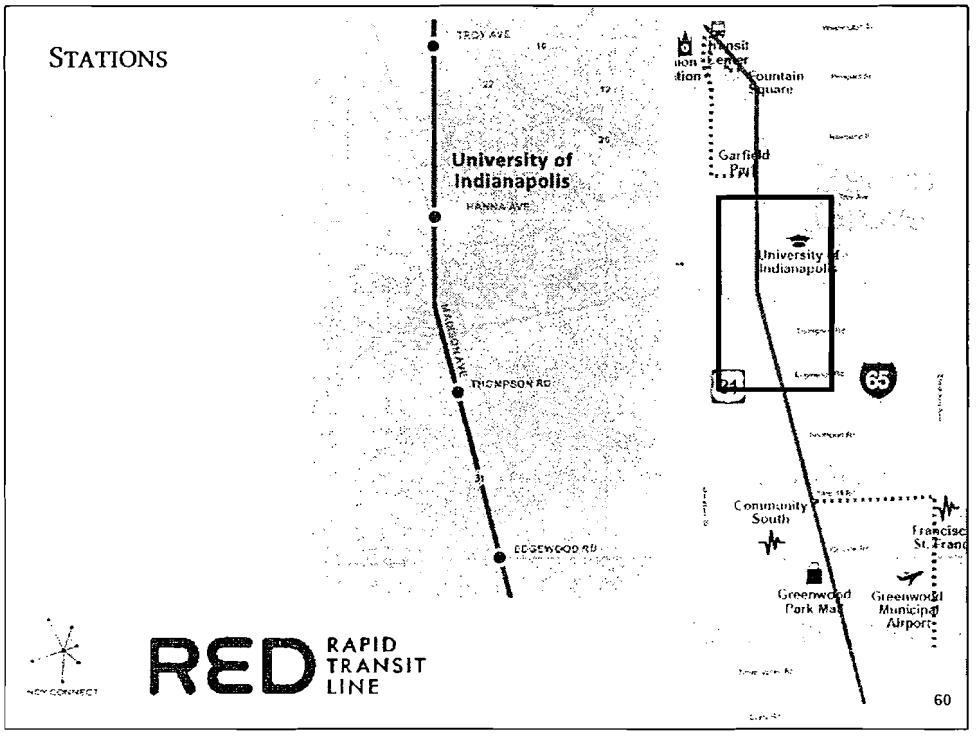



RED RAPID TRANSIT LINE

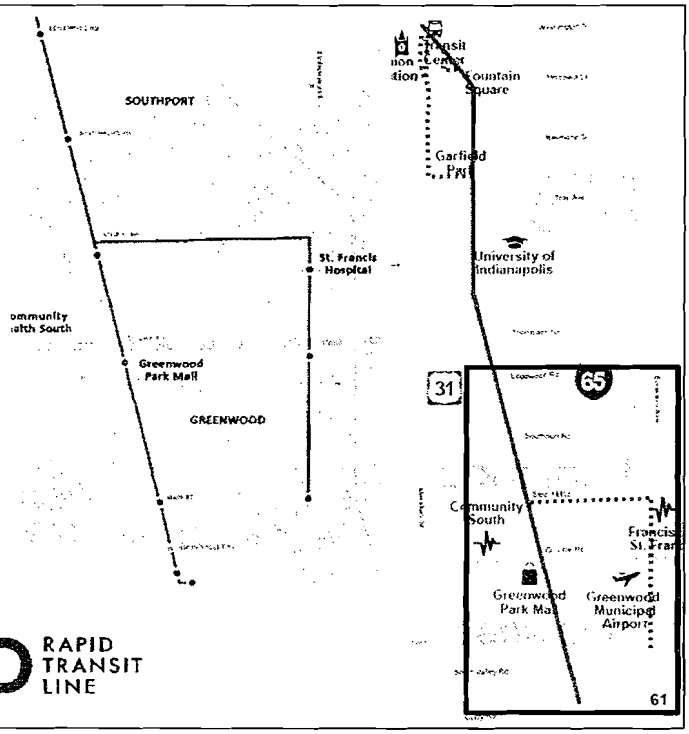

STATIONS
Broad Ripple
State Fairgrounds
Crown Hill
Children's Museum
Ivy Tech
RED
RAPID TRANSIT LINE


STATIONS
16th
10th
Michigan
New York
Methodist Hospital
State Capitol
Transit Center
Washington
Anthem
Eli Lilly
Fountain Square
RED
RAPID TRANSIT LINE


STATIONS
Transit Center
Anthem
Eli Lilly
PROSPECT ST
Fountain Square
RAYMOND ST
SOUTHERN AVE
Garfield Park
TROY AVE
WASHINGTON AVE
VIRGINIA AVE
PENNSYLVANIA ST
DELAWARE ST
EAST ST
MARTY ST
Garfield Park
University of Indianapolis
31
65
Community South
Greenwood Park Mall
Greenwood Municipal Airport
RED RAPID TRANSIT LINE
59

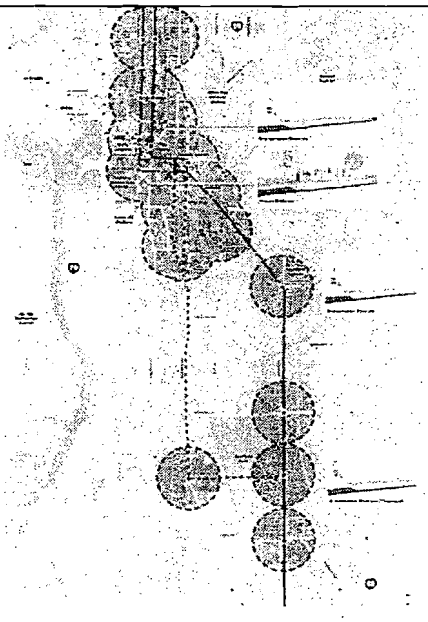

STATIONS
TROY AVE
University of Indianapolis
HANNA AVE
MADISON AVE
THOMPSON RD
EDGEWOOD RD
Fountain Square
Garfield Park
University of Indianapolis
31
65
Community South
Greenwood Park Mall
Greenwood Municipal Airport
RED RAPID TRANSIT LINE
60

## STATIONS




RED RAPID TRANSIT LINE

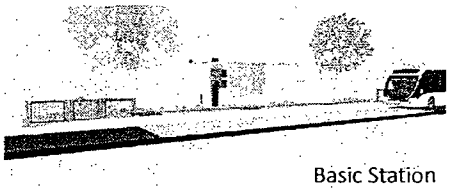
## STATIONS



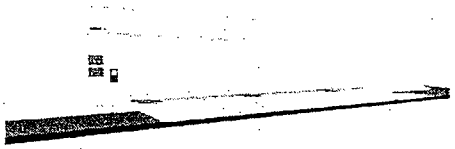
RED RAPID TRANSIT LINE

62

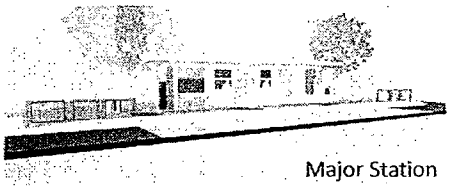
## STATIONS



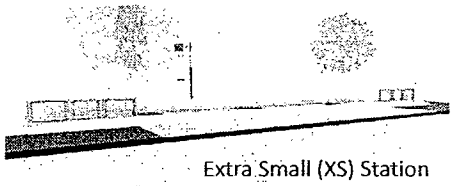
Basic Station



Storefront Station



Major Station



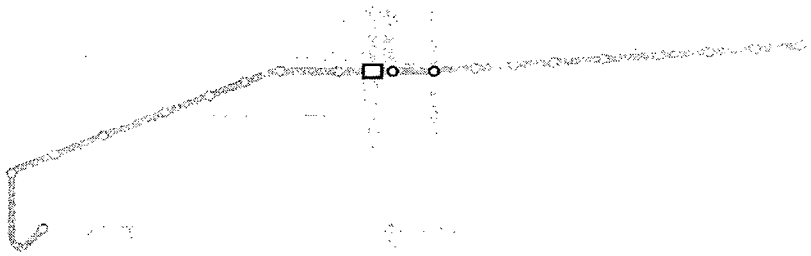
Extra Small (XS) Station

RED RAPID TRANSIT LINE

63

BLUE RAPID TRANSIT LINE

Alternatives Analysis



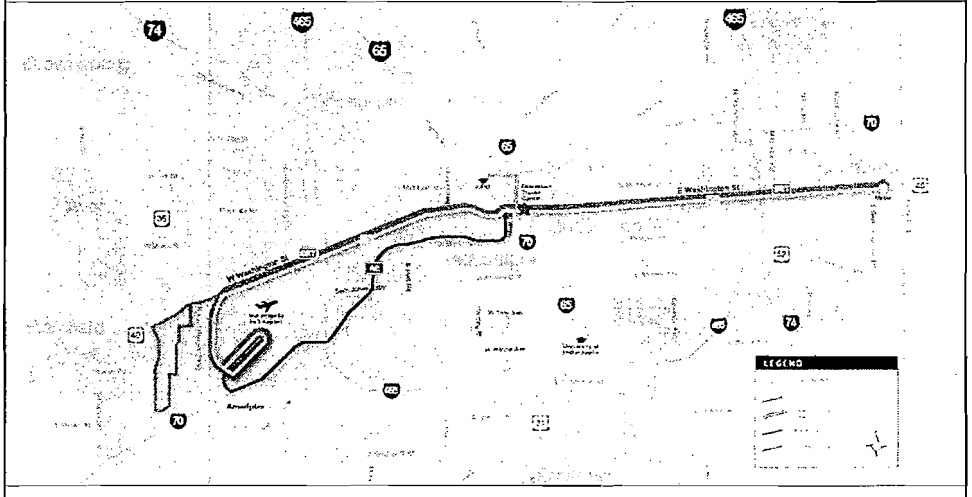
INDY CONNECT

## VEHICLES


INDY CONNECT BLUE RAPID TRANSIT LINE

65

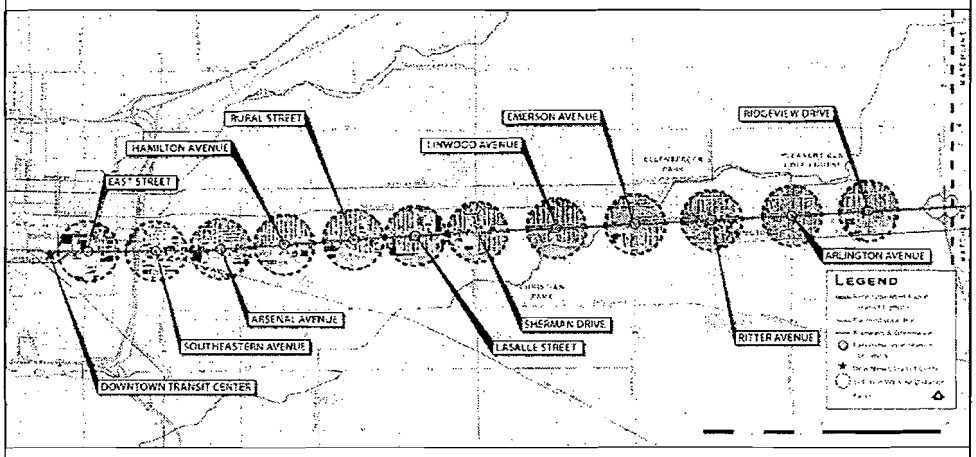
## BLUE LINE ROUTE




INDY CONNECT BLUE RAPID TRANSIT LINE

66

## EAST SIDE STATIONS

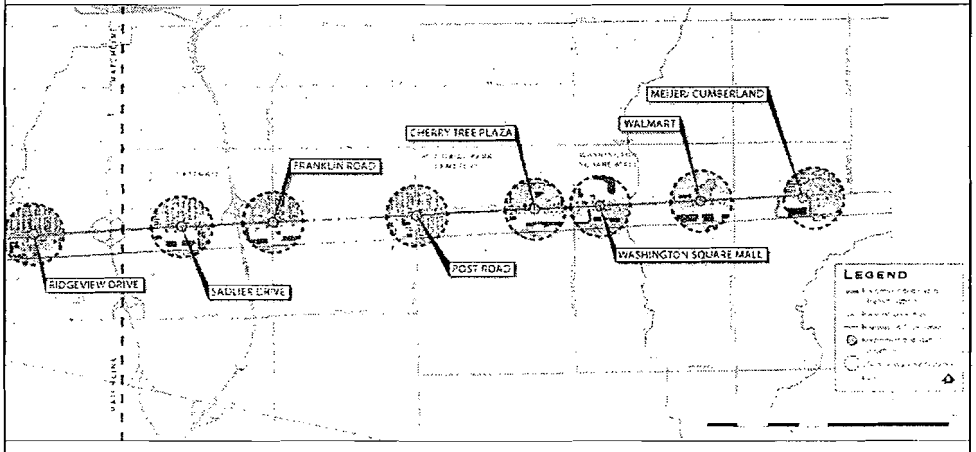



[redacted]

INDY CONNECT BLUE RAPID TRANSIT LINE

71

## EAST SIDE STATIONS

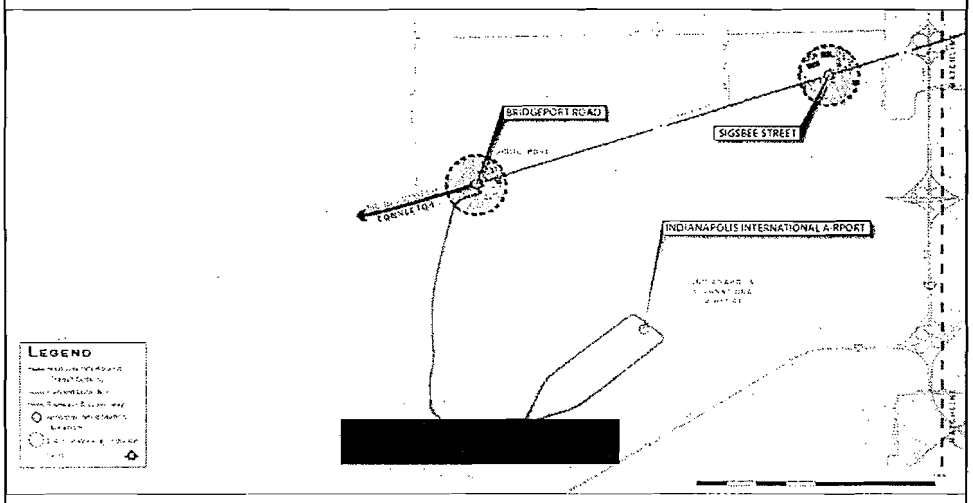



[redacted]

INDY CONNECT BLUE RAPID TRANSIT LINE

72

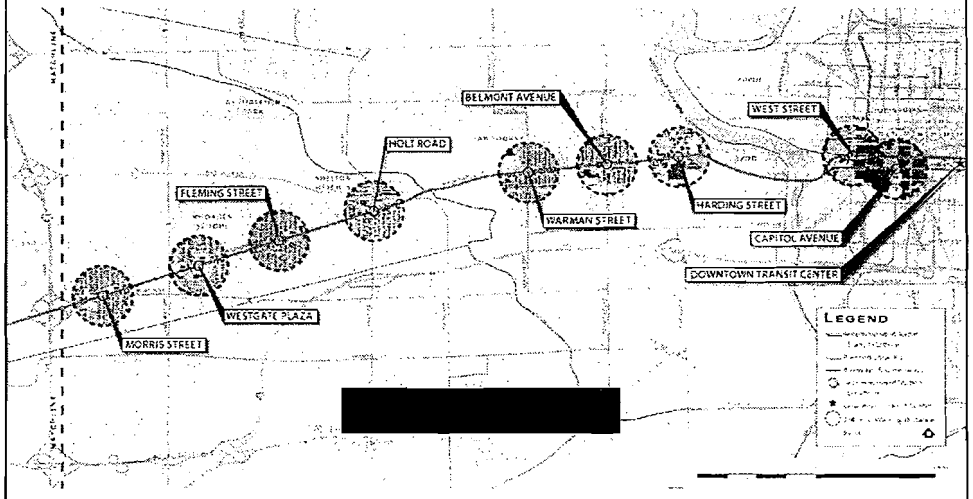
## WEST SIDE STATIONS




INDY CONNECT BLUE RAPID TRANSIT LINE

74

## WEST SIDE STATIONS




INDY CONNECT BLUE RAPID TRANSIT LINE

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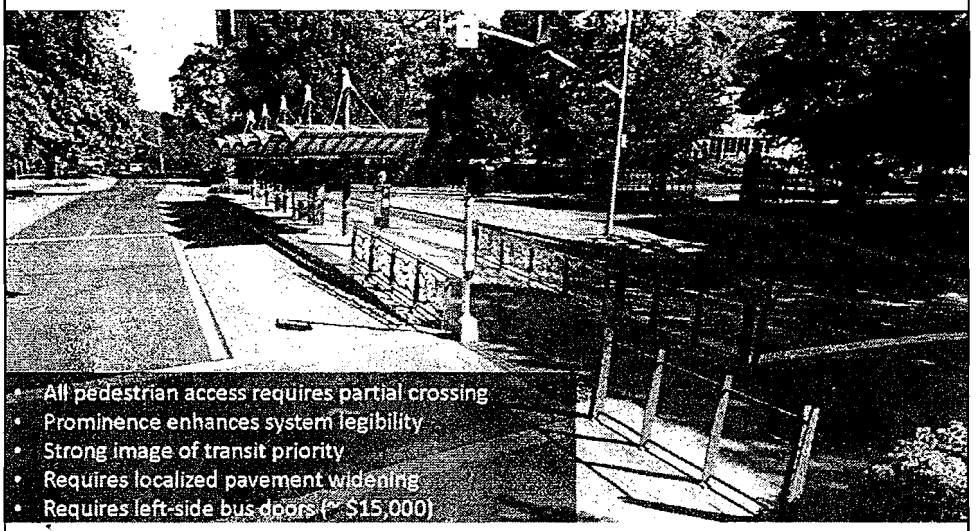
## Median Stations



- All pedestrian access requires partial crossing
- Prominence enhances system legibility
- Strong image of transit priority
- Requires localized pavement widening
- Requires left-side bus doors (~ $15,000)

INDY CONNECT BLUE RAPID TRANSIT LINE

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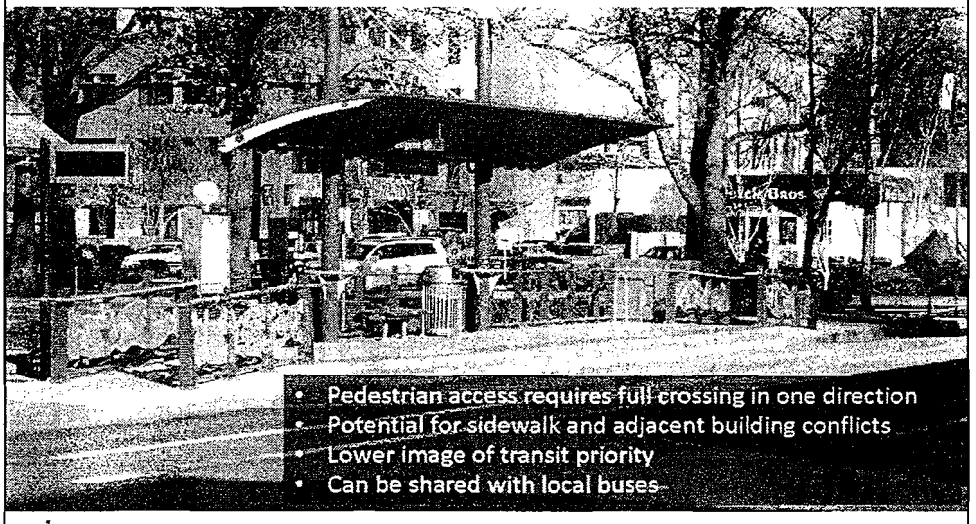
## Curbside Stations



- Pedestrian access requires full crossing in one direction
- Potential for sidewalk and adjacent building conflicts
- Lower image of transit priority
- Can be shared with local buses

INDY CONNECT BLUE RAPID TRANSIT LINE

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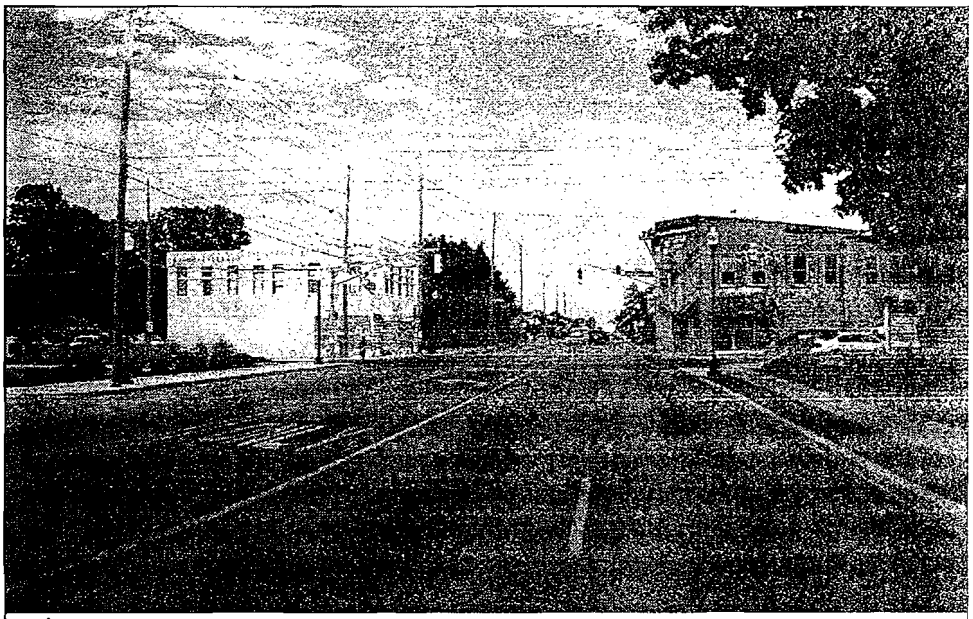

INDY CONNECT

RAPID
TRANSIT
LINE

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INDY CONNECT

RAPID
TRANSIT
LINE

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BLUE RAPID TRANSIT LINE

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GREEN RAPID TRANSIT LINE

Draft Environmental Impact Statement

INDY CONNECT

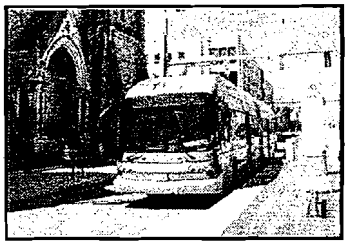
## PROJECT OVERVIEW

**Continued Refinement of Alternatives**

- 23-mile alignment via former rail corridor
- Mode Options narrowed to BRT and LRT
- Focus on in-street alignments to Downtown Transit Center
- Current Station Studies will fully define alternatives

**Environmental Impact Statement**

- Range of Technical Reports in Preparation
- Section 106 review is critical path
- Formal public hearing anticipated spring/summer 2014



INDY CONNECT GREEN RAPID TRANSIT LINE

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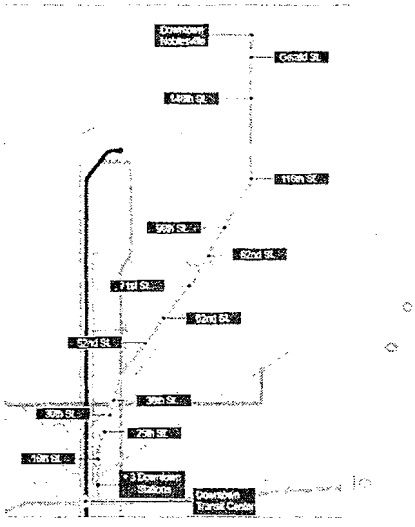
## STATIONS




**17 Stations under study:**

- **Provide General Access.** Stations distributed throughout, some park and ride
- **Provide regional transit system connections.** Downtown Transit Center Downtown Noblesville Connect to other major routes
- **Encourage transit oriented development.** Examine station siting for best development potential

INDY CONNECT GREEN RAPID TRANSIT LINE

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## CSX Option

**Access Downtown Transit Center from Union Station (6 blocks):**

- Rail only (no BRT) "Heavy DMU" Required
- Cannot access Downtown Transit Center Directly
- No additional downtown stops
- Requires construction of a third track next to existing CSX tracks ($60M +/-)
- Relocate CSX freight trains to the Belt Railroad ($200M +/-)


INDY CONNECT GREEN RAPID TRANSIT LINE

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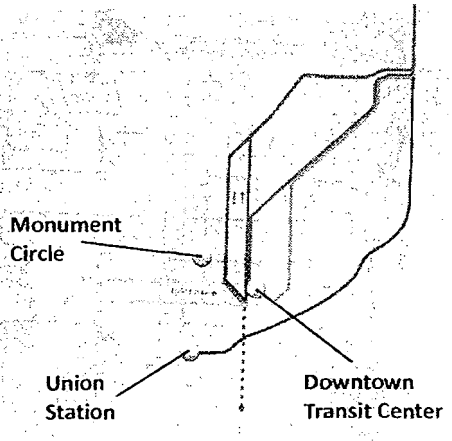
## Street Running Options

**Major topics:**

Which Streets?

Which Vehicle?

What are the impacts to traffic, drive access & parking?




INDY CONNECT GREEN RAPID TRANSIT LINE

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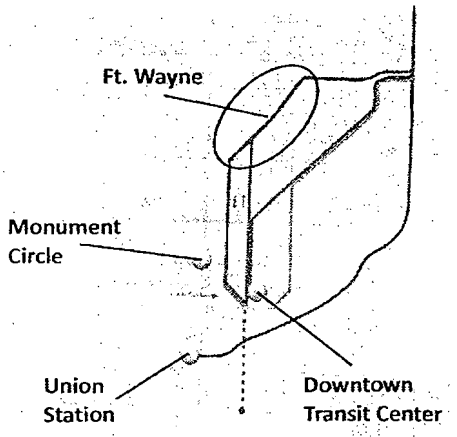
## Street Running Options

**Major topics:**

Which Streets?

Which Vehicle?

What are the impacts to traffic, drive access & parking?




RAPID TRANSIT LINE

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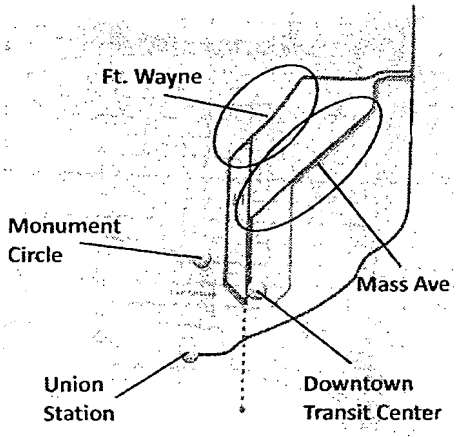
## Street Running Options

**Major topics:**

Which Streets?

Which Vehicle?

What are the impacts to traffic, drive access & parking?




RAPID TRANSIT LINE

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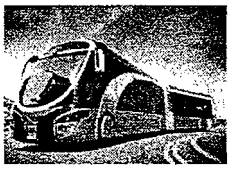
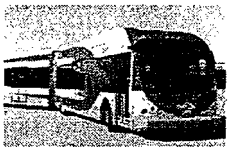
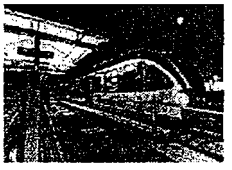
## BUS RAPID TRANSIT OR LIGHT RAIL?





| | | |
|---|---|---|
| 7-10 min | **Frequency** | 15 min |
| 60 passengers<br>12 years<br>$950,000 | **Per Vehicle** | 120 passengers<br>per car<br>25 years<br>$6.5M |
| 17 | **Stations** | 17 |
| Could leave busway and mix with traffic | **Flexibility** | Service stays on rails, establishing permanence |
| 75-80 db | **Intersections** | 75-80 db |
| | **Capital Costs** | |
| $205.7M | Guideway | $175.1M |
| $18.3M | Systems | $68.8M |
| $8.7M | Facilities | $18.6M |
| $26.5M | Vehicles | $68.4M |
| $91.4M | Other | $107.8M |
| **$350.6M** | **Total** | **$438.7M** |
| | **Operating Costs** | |
| $11M/year | 5,000 trips/day | $11M/year |
| $15M/year | 10,000 trips/day | $14M/year |



All numbers are preliminary estimates; more detailed analysis by end of year

INDY CONNECT

GREEN RAPID TRANSIT LINE

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## INDY CONNECT PHASING PLAN

INDY CONNECT

RED LINE
North-South

BLUE LINE

DOWNTOWN CIRCULATORS

PURPLE LINE

ORANGE LINE

GREEN LINE

RED LINE FULLY OPERATIONAL

$102.6M

DOWNTOWN CIRCULATORS FULLY OPERATIONAL

$30.4M

2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

## This is about the economic impact.

3:1 return

Ball State's *Center for Business and Economic Research* found that a **$1 investment in public transit spins off a $3 economic impact** for the local economy. So a $1.3 billion capital investment = $3.9 billion local economic impact.

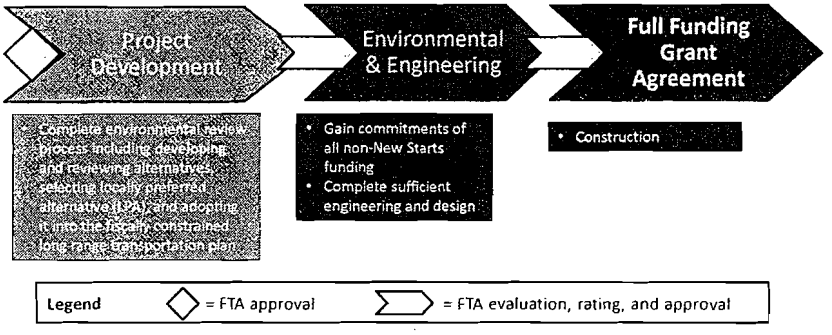
11.2% roi & 2:1 c/b

CITTF and HDR found an **11.2% ROI and a 2:1 ratio of benefits to costs** on the transit portion of the region's long range transportation plan.

$3.8 billion & 7,000 jobs

Morris & Lloyds Associates' IMPLAN analysis of Indy Connect found that the capital and operating investments alone would generate **$3.8 billion economic impact and 7,000 jobs** for the local economy (no secondary or resulting investments were assumed). That's 3,809 construction jobs and 3,373 permanent jobs.

## FTA SMALL STARTS PROCESS




- Rules are being updated for MAP-21
- Alternatives Analysis (AA) process has been required to enter Project Development

# NEXT STEPS

- ❑ Complete Red Line and Blue Line alternatives analysis (December 2013)
- ❑ Apply for entry into the Federal Transit Administration's Small Starts capital funding program for the Red and Blue Lines (Spring 2014)
- ❑ Begin studies of Purple Line, Orange Line, and Downtown Circulators (2014)
- ❑ Update IndyGo Comprehensive Operations Analysis (2014)
- ❑ Complete Green Line environmental impact statement and preliminary engineering (July 2014)
- ❑ Assist IndyGo in planning, engineering, and environmental processes associated with the opening of the Downtown Transit Center (2015)

# The Indy Connect Funding Plan

September 10, 2013

ITS
9/30/13
Ex. C

BioCrossroads CICP CONEXUS INDIANA ESN TECHPOINT

# Features of the Funding Plan

- Dedicated local funds to leverage federal grants
- "Pay as you go" for most capital expenses
- Minimal debt service:
  - As needed in year 6 or 7 for capital build out
  - 15% of total revenues
  - Debt service payments built into revenue cash flow projections
- Conservative estimates on federal grant amounts
- Conservative projections of revenue growth

CICP BioCrossroads CONEXUS INDIANA ESN TECHPOINT

# DETAILED COST MODEL AND CASH FLOW ANALYSIS

| Revenues | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2015-2035 Total | 2015-2035 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Federal Funding | | | | | | | | | | | | | | | | | | | | | | | |
| Federal 5307 Urban Formula | $23.8 | $24.2 | $24.5 | $24.9 | $25.3 | $25.6 | $27.1 | $27.4 | $27.8 | $28.9 | $30.4 | $30.8 | $31.4 | $32.0 | $32.6 | $33.0 | $33.4 | $33.8 | $34.2 | $34.7 | $35.1 | $290.0 | $620.9 |
| Federal 5309 New Starts Grants | $7.8 | | $17.2 | $59.2 | | $37.6 | $100.2 | $59.5 | | | | | | | | | | | | | | $281.5 | $281.5 |
| Regional Transportation Grants[1] | | | $23.8 | $36.6 | | $40.3 | $20.2 | $20.2 | | | | | | | | $55.0 | | | $25.4 | | | $141.1 | $222.5 |
| State Funding | | | | | | | | | | | | | | | | | | | | | | | |
| State Public Mass Transit Fund (PMTF) | $10.1 | $9.8 | $9.6 | $9.4 | $9.2 | $9.0 | $8.8 | $8.6 | $8.4 | $8.2 | $8.0 | $7.8 | $7.7 | $7.5 | $7.3 | $7.1 | $7.0 | $6.8 | $6.7 | $6.5 | $6.4 | $99.1 | $169.9 |
| Local Funding | | | | | | | | | | | | | | | | | | | | | | | |
| Marion County Property Tax | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $25.4 | $279.2 | $533.0 |
| New Transit Tax (0.3%) | $87.7 | $89.0 | $90.4 | $91.8 | $93.3 | $94.7 | $96.2 | $97.7 | $99.2 | $100.8 | $102.4 | $104.0 | $105.6 | $107.3 | $109.0 | $110.7 | $112.4 | $114.2 | $116.0 | $117.9 | $119.7 | $1,043.2 | $2,159.9 |
| Fare Revenues | $14.8 | $16.1 | $16.8 | $16.0 | $22.3 | $21.7 | $22.0 | $29.3 | $33.1 | $33.9 | $35.5 | $37.1 | $38.7 | $39.0 | $39.5 | $40.0 | $40.5 | $41.0 | $41.5 | $42.1 | $42.7 | $260.5 | $662.7 |
| **Total Revenues** | **$169.6** | **$164.6** | **$206.8** | **$263.4** | **$175.4** | **$254.3** | **$299.7** | **$268.0** | **$193.8** | **$197.2** | **$201.6** | **$205.0** | **$208.7** | **$211.1** | **$213.7** | **$271.2** | **$218.7** | **$221.3** | **$249.3** | **$226.5** | **$229.2** | **$2,394.5** | **$4,660.4** |

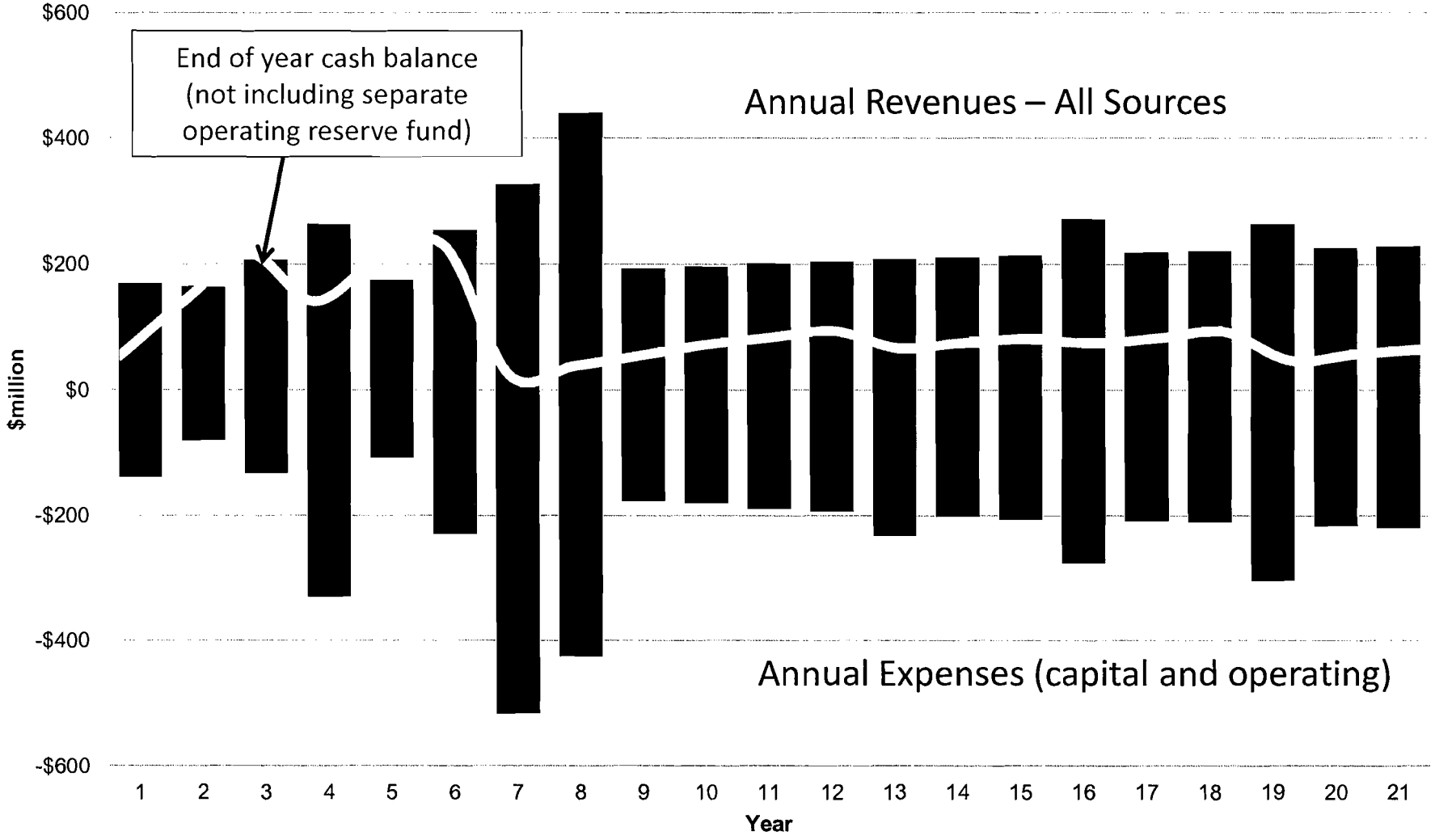
| Expenditures | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2015-2035 Total | 2015-2035 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Capital | | | | | | | | | | | | | | | | | | | | | | | |
| Rapid Transit Corridors | | | | | | | | | | | | | | | | | | | | | | | |
| Blue Line (E-W Corridor) | | | $31.7 | $68.2 | | | | | | | | | | | | | | | | | | $99.8 | $99.8 |
| Green Line (NE Corridor) | | | | | | $104.5 | $142.9 | $160.7 | | | | | | | | | | | | | | $407.6 | $407.6 |
| Orange Line (Keystone) | | | | | | | $82.6 | | | | | | | | | | | | | | | $82.6 | $82.6 |
| Purple Line (38th St) | | | | | | | $63.2 | | | | | | | | | | | | | | | $63.2 | $63.2 |
| Red Line (N-S Corridor) | | | $22.0 | $55.9 | | | | | | | | | | | | | | | | | | $78.0 | $78.0 |
| Downtown Circulators | | | | $25.8 | | | | | | | | | | | | | | | | | | $25.8 | $25.8 |
| *Rapid Transit Sub-Total* | *0* | *0* | *$53.7* | *$149.9* | *0* | *$104.5* | *$288.2* | *$160.7* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *$757.0* | *$757.0* |
| Facilities | | | | | | | | | | | | | | | | | | | | | | | |
| BRT Storage and Maintenance Facility | | | | $37.5 | | | | | | | | | | | | | | | | | | $37.5 | $37.5 |
| Bus Storage and Maintenance Facility | $39.0 | | | | | | | | | | | | | | | | | | | | | $39.0 | $39.0 |
| Regional Transit Facilities | | | | | | $20.8 | $39.8 | $40.2 | | | | | | | | | | | | | | $100.9 | $100.9 |
| *Facilities Sub-Total* | *$39.0* | *0* | *0* | *$37.5* | *0* | *$20.8* | *$39.8* | *$40.2* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *$177.3* | *$177.3* |
| Vehicles | | | | | | | | | | | | | | | | | | | | | | | |
| Light Rail Vehicles | | | | | | | | $75.6 | | | | | | | | | | | | | | $75.6 | $75.6 |
| LRT Vehicles | | | | | | | | | | | | | | | | | | | | | | | |
| STC Vehicles | | | | | | | | | | | | | | | | | | | | | | | |
| BRT Vehicles | | | | $62.7 | | | $37.7 | | | | | | | | | $70.2 | | | $42.2 | | | $100.4 | $212.8 |
| Buses | $34.5 | $7.2 | $7.2 | $7.3 | $7.4 | $7.4 | $48.9 | $7.6 | $7.7 | $7.7 | $7.8 | $7.9 | $38.7 | $8.0 | $8.1 | $8.2 | $8.3 | $8.3 | $54.7 | $8.5 | $8.6 | $150.8 | $310.1 |
| Paratransit Vehicles | $2.0 | $1.4 | $1.4 | $1.4 | $2.1 | $1.4 | $3.7 | $1.5 | $2.2 | $1.5 | $3.8 | $1.5 | $2.3 | $1.5 | $3.9 | $1.6 | $2.3 | $1.6 | $4.1 | $1.6 | $2.4 | $22.3 | $45.3 |
| *Vehicles Sub-Total* | *$36.5* | *$8.6* | *$8.6* | *$71.4* | *$9.5* | *$8.9* | *$90.3* | *$84.7* | *$9.8* | *$9.2* | *$11.6* | *$9.4* | *$40.9* | *$9.6* | *$12.1* | *$80.0* | *$10.6* | *$9.9* | *$101.1* | *$10.1* | *$11.0* | *$348.1* | *$643.5* |
| Bus Shelter / Amenities Program | | $3.1 | $3.1 | $3.2 | $3.2 | $3.2 | $3.3 | $3.3 | $3.3 | $3.4 | $3.4 | $3.4 | $3.5 | $3.5 | $3.5 | $3.6 | $3.6 | $3.6 | $3.7 | $3.7 | $3.7 | $32.5 | $68.3 |
| **Capital Expenditures** | **$75.5** | **$11.7** | **$65.5** | **$281.9** | **$12.7** | **$137.6** | **$421.5** | **$288.9** | **$13.2** | **$12.6** | **$15.0** | **$12.8** | **$44.4** | **$13.1** | **$16.6** | **$83.5** | **$14.2** | **$13.6** | **$104.7** | **$13.8** | **$14.7** | **$1,315.9** | **$1,646.4** |

| Operating | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2015-2035 Total | 2015-2035 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rapid Transit Corridors | | | | | | | | | | | | | | | | | | | | | | | |
| Blue Line (E-W Corridor) | | | | | $11.2 | $11.4 | $11.5 | $12.2 | $12.4 | $12.5 | $12.6 | $12.8 | $12.9 | $13.1 | $13.2 | $13.4 | $13.5 | $13.7 | $13.9 | $14.0 | $14.2 | $83.9 | $218.5 |
| Green Line (NE Corridor) | | | | | | | | | $14.0 | $14.2 | $14.4 | $14.6 | $14.8 | $15.0 | $15.2 | $15.4 | $15.6 | $15.8 | $16.1 | $16.3 | $16.6 | $42.7 | $198.0 |
| Orange Line (Keystone) | | | | | | | | $10.0 | $10.1 | $10.2 | $10.4 | $10.5 | $10.6 | $10.7 | $10.9 | $11.0 | $11.1 | $11.2 | $11.4 | $11.5 | $11.6 | $40.8 | $151.2 |
| Purple Line (38th St) | | | | | | | | $5.6 | $5.6 | $5.7 | $5.8 | $5.8 | $5.9 | $6.0 | $6.0 | $6.1 | $6.2 | $6.3 | $6.3 | $6.4 | $6.5 | $22.7 | $84.2 |
| Red Line (N-S Corridor) | | | | | $8.9 | $9.0 | $9.1 | $9.7 | $9.8 | $9.9 | $10.0 | $10.1 | $10.2 | $10.4 | $10.5 | $10.6 | $10.7 | $10.8 | $11.0 | $11.1 | $11.2 | $56.3 | $172.9 |
| Downtown Circulators | | | | | $6.1 | $6.1 | $6.2 | $6.6 | $6.7 | $6.7 | $6.8 | $6.9 | $7.0 | $7.1 | $7.1 | $7.2 | $7.3 | $7.4 | $7.5 | $7.6 | $7.7 | $45.2 | $117.9 |
| *Rapid Transit Sub-Total* | *0* | *0* | *0* | *0* | *$26.2* | *$26.6* | *$26.8* | *$44.1* | *$58.6* | *$59.3* | *$60.0* | *$60.7* | *$61.4* | *$62.2* | *$62.9* | *$63.7* | *$64.6* | *$65.3* | *$66.1* | *$66.9* | *$67.6* | *$301.8* | *$942.9* |
| Local, Express, & Paratransit | | | | | | | | | | | | | | | | | | | | | | | |
| Local Bus | $46.5 | $57.1 | $57.8 | $58.5 | $52.0 | $52.7 | $53.3 | $54.1 | $58.8 | $63.1 | $68.3 | $73.7 | $79.3 | $80.2 | $81.2 | $82.2 | $83.2 | $84.2 | $85.3 | $86.3 | $87.4 | $622.1 | $1,445.2 |
| Express Bus | | | | | | | | $5.3 | $4.4 | $4.8 | $5.1 | $5.6 | $6.0 | $6.0 | $6.1 | $6.2 | $6.3 | $6.3 | $6.4 | $6.5 | $6.6 | $20.6 | $82.6 |
| Paratransit | $8.2 | $10.1 | $10.2 | $10.3 | $13.8 | $13.9 | $14.1 | $17.0 | $17.3 | $17.6 | $17.9 | $18.2 | $18.5 | $18.8 | $19.2 | $19.5 | $19.8 | $20.2 | $20.5 | $20.8 | $21.2 | $150.5 | $347.2 |
| *Local, Express, & Paratransit Sub-Total* | *$54.6* | *$67.1* | *$67.9* | *$68.8* | *$65.8* | *$66.6* | *$67.4* | *$77.4* | *$80.5* | *$85.5* | *$91.4* | *$97.5* | *$103.8* | *$105.1* | *$106.5* | *$107.9* | *$109.3* | *$110.7* | *$112.2* | *$113.7* | *$115.2* | *$793.2* | *$1,875.0* |
| Operating Reserve Fund Contribution | $9.0 | $2.1 | $0.1 | $0.1 | $3.8 | $0.2 | $0.2 | $4.5 | $2.9 | $0.9 | $1.1 | $1.1 | $1.1 | $0.3 | $0.3 | $0.4 | $0.4 | $0.4 | $0.4 | $0.4 | $0.4 | $24.9 | $30.1 |
| **Operations Expenditures** | **$63.6** | **$69.2** | **$68.1** | **$68.9** | **$95.9** | **$93.3** | **$94.4** | **$126.9** | **$142.1** | **$146.7** | **$152.4** | **$159.3** | **$166.3** | **$167.6** | **$169.8** | **$171.9** | **$174.1** | **$176.4** | **$178.6** | **$181.0** | **$183.3** | **$1,119.5** | **$2,848.0** |

| Cash Flow | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2015-2035 Total | 2015-2035 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenues | | | | | | | | | | | | | | | | | | | | | | | |
| Revenues | $169.6 | $164.6 | $206.8 | $263.4 | $175.4 | $254.3 | $299.7 | $268.0 | $193.8 | $197.2 | $201.6 | $205.0 | $208.7 | $211.1 | $213.7 | $271.2 | $218.7 | $221.3 | $249.3 | $226.5 | $229.2 | $2,394.5 | $4,660.4 |
| Long-Term Bond Proceeds | 0 | 0 | 0 | 0 | 0 | 0 | $27.2 | $172.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $13.8 | 0 | 0 | $199.3 | $213.2 |
| Short-Term Bond Proceeds | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| *Total Revenues* | *$169.6* | *$164.6* | *$206.8* | *$263.4* | *$175.4* | *$254.3* | *$326.9* | *$440.2* | *$193.8* | *$197.2* | *$201.6* | *$205.0* | *$208.7* | *$211.1* | *$213.7* | *$271.2* | *$218.7* | *$221.3* | *$263.1* | *$226.5* | *$229.2* | *$2,593.8* | *$4,883.6* |
| Expenses | | | | | | | | | | | | | | | | | | | | | | | |
| Capital Expenditures | $75.5 | $11.7 | $65.5 | $281.9 | $12.7 | $137.6 | $421.5 | $288.9 | $13.2 | $12.6 | $15.0 | $12.8 | $44.4 | $13.1 | $16.6 | $83.5 | $14.2 | $13.6 | $104.7 | $13.8 | $14.7 | $1,315.9 | $1,646.4 |
| Operating Expenditures | $63.6 | $69.2 | $68.1 | $68.9 | $95.9 | $93.3 | $94.4 | $126.9 | $142.1 | $146.7 | $152.4 | $159.3 | $166.3 | $167.6 | $169.8 | $171.9 | $174.1 | $176.4 | $178.6 | $181.0 | $183.3 | $1,119.5 | $2,848.0 |
| Long-Term Debt Service | 0 | 0 | 0 | 0 | 0 | 0 | $1.3 | $11.4 | $22.4 | $22.2 | $22.0 | $21.8 | $21.7 | $21.5 | $21.4 | $21.3 | $21.2 | $21.1 | $21.6 | $22.5 | $22.4 | $79.3 | $295.7 |
| Short-Term Debt Service | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| *Total Expenditures* | *$139.1* | *$80.9* | *$133.6* | *$350.8* | *$108.5* | *$230.8* | *$517.2* | *$426.2* | *$177.6* | *$180.5* | *$189.5* | *$194.0* | *$232.4* | *$202.2* | *$208.7* | *$276.7* | *$209.5* | *$211.0* | *$305.0* | *$217.2* | *$220.4* | *$2,514.8* | *$4,790.0* |
| Cash Balance | | | | | | | | | | | | | | | | | | | | | | | |
| Beginning Cash Balance | 0 | $29.9 | $111.2 | $180.3 | $110.3 | $173.2 | $192.3 | $1.9 | $15.5 | $31.0 | $46.6 | $57.5 | $67.0 | $42.3 | $50.0 | $55.9 | $49.1 | $57.0 | $65.8 | $24.4 | $32.9 | | |
| Change to Cash Balance | $30.5 | $83.7 | $73.2 | -$67.5 | $66.9 | $23.5 | -$190.3 | $13.9 | $16.2 | $16.7 | $12.2 | $11.0 | -$23.7 | $8.9 | $7.0 | -$5.5 | $9.2 | $10.3 | -$40.9 | $9.3 | $8.8 | | |
| **End of Year Cash Balance** | **$30.5** | **$113.6** | **$184.5** | **$112.9** | **$177.2** | **$196.7** | **$2.0** | **$15.8** | **$31.7** | **$47.7** | **$58.8** | **$68.5** | **$43.3** | **$51.2** | **$57.0** | **$50.4** | **$58.4** | **$67.3** | **$24.9** | **$33.7** | **$41.7** | | |
| **Operating Reserve Fund Balance** | **$9.0** | **$11.0** | **$11.2** | **$11.3** | **$15.1** | **$15.3** | **$15.6** | **$20.0** | **$22.9** | **$23.8** | **$24.9** | **$26.0** | **$27.2** | **$27.5** | **$27.8** | **$28.2** | **$28.5** | **$28.9** | **$29.3** | **$29.7** | **$30.1** | | |

[1]Regional Transportation Grants average $8.9 million per year over the 25 year program, per the Indianapolis Regional Transportation Council's 10% transit funding goal

# Long-Term Cash Flow Analysis

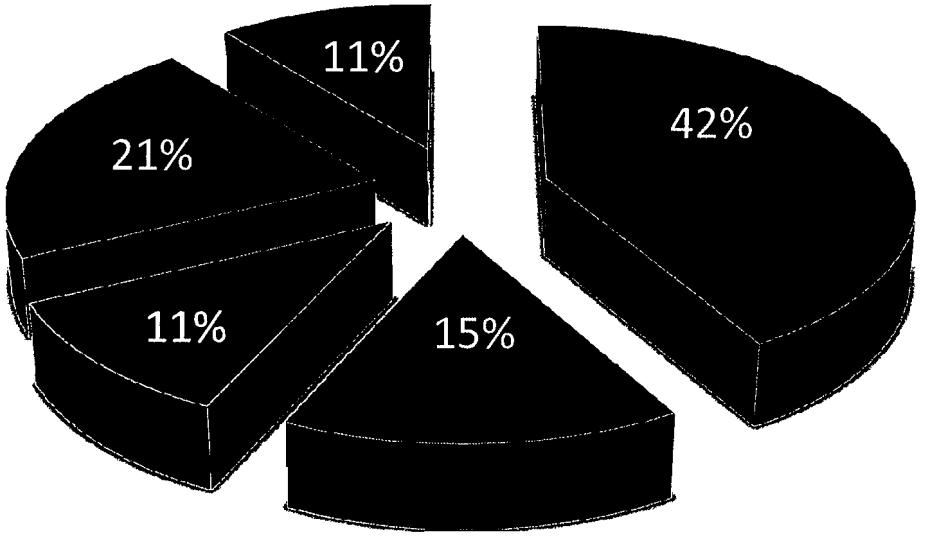



CICP

BioCrossroads CONEXUS INDIANA ESN TECHPOINT

# Capital Revenues By Proposed Source (over 10 years)

Federal Funds = 43%




- Local Funds $548.5 (42%)
- Long term bonds $199.3 (15%)
- Federal Urban Formula $145.5 (11%)
- Federal New Starts Grants $281.5 (21%)
- Regional Transportation Grants $141.1 (11%)

# Projected 2025 Annual Operating Revenues and Expenses:
## Assumes Total Phase 1 System Build out as Proposed

| **Annual Operating Revenue ($2012)** | |
|---|---|
| Federal Urban Formula Grant | $ 15.4 |
| State PMTF | $ 8.0 |
| Marion County Property Tax | $ 25.4 |
| New Transit Tax -- Dedicated Local Source | $ 102.4 |
| Fare Receipts | $ 35.5 |
| ***Annual Operating Revenues*** | ***$ 186.6*** |
| | |
| **Annual Operating Expense ($2012)** | |
| Rapid Transit Corridors | $ 60.0 |
| Local Bus, Express Bus and Paratransit | $ 91.4 |
| Contribution to Debt Service | $ 22.0 |
| Reserve Fund Contribution | $ 1.1 |
| ***Annual Operating Expense*** | ***$ 174.5*** |

# Evolution of Task Force Proposal for Local Dedicated Funding Source

| Reviewed multiple funding options for transit: | |
|---|---|
| Local sales or income tax | Vehicle registration tax |
| Food and beverage tax | Motor fuel taxes |

| | **February 2010 0.5% local sales tax** * Based on 2007 taxable sales, per Stats Indiana/Dept of Revenue | **November 2011 0.3% local income tax** * Based on projected 2015 income tax base | **New Option? 0.5% local sales tax** * Based on 2011 taxable sales, per Stats Indiana/Dept of Revenue |
|---|---|---|---|
| Marion | $53.8 million | $55.0 million | $45.9 million |
| Hamilton | $21.3 million | $32.0 million | $10.5 million |

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# Comparative Sales Tax Rates in Major U.S. Cities

*Tax Foundation Fiscal Fact, No. 296* — *April 11th, 2012*

| | | | | | |
|---|---|---|---|---|---|
| Riverside (c) | California | 7.25% | 0.5% | 7.75% | 53 |
| Sacramento (c) | California | 7.25% | 0.5% | 7.75% | 53 |
| San Diego (c) | California | 7.25% | 0.5% | 7.75% | 53 |
| Santa Ana (c) | California | 7.25% | 0.5% | 7.75% | 53 |
| Reno | Nevada | 6.85% | 0.875% | 7.725% | 61 |
| Saint Paul | Minnesota | 6.875% | 0.75% | 7.625% | 62 |
| Denver | Colorado | 2.9% | 4.72% | 7.62% | 63 |
| Colorado Springs | Colorado | 2.9% | 4.5% | 7.4% | 64 |
| Modesto (c) | California | 7.25% | 0.125% | 7.375% | 65 |
| Wichita | Kansas | 6.3% | 1.0% | 7.3% | 66 |
| Charlotte | North Carolina | 4.75% | 2.5% | 7.25% | 67 |
| Bakersfield (c) | California | 7.25% | 0.0% | 7.25% | 67 |
| Durham | North Carolina | 4.75% | 2.25% | 7.0% | 69 |
| Fayetteville | North Carolina | 4.75% | 2.25% | 7.0% | 69 |
| Fort Wayne | Indiana | 7.0% | 0.0% | 7.0% | 69 |
| Indianapolis | Indiana | 7.0% | 0.0% | 7.0% | 69 |
| Jersey City | New Jersey | 7.0% | 0.0% | 7.0% | 69 |
| Lincoln | Nebraska | 5.5% | 1.5% | 7.0% | 69 |
| Newark | New Jersey | 7.0% | 0.0% | 7.0% | 69 |
| Omaha (g) | Nebraska | 5.5% | 1.5% | 7.0% | 69 |
| Hialeah | Florida | 6.0% | 1.0% | 7.0% | 69 |
| Jacksonville | Florida | 6.0% | 1.0% | 7.0% | 69 |
| Miami | Florida | 6.0% | 1.0% | 7.0% | 69 |
| Pittsburgh | Pennsylvania | 6.0% | 1.0% | 7.0% | 69 |
| Saint Petersburg | Florida | 6.0% | 1.0% | 7.0% | 69 |
| Tampa | Florida | 6.0% | 1.0% | 7.0% | 69 |

7.5% sales tax rate would move Indy from 69th to 64th

Peer Cities sales tax rates (state & local):

| | |
|---|---|
| Chicago | 9.5% |
| Seattle | 9.5% |
| Phoenix | 9.3% |
| Nashville | 9.25% |
| St. Louis | 8.491% |
| OKC | 8.375% |
| Austin | 8.25% |
| Atlanta | 8.0% |
| Kansas City | 7.85% |
| Minneapolis | 7.775% |
| Cleveland | 7.75% |

Source: Tax Foundation Fiscal Fact No. 296, April 11, 2012

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# QUESTIONS

# Central Indiana Transit Study Committee

September 10, 2013

Presentation by:

## Indiana Transportation Association

By:

Michael Hicks, Ph.D.

**Index:**



**CD containing entire studies attached to back page of binder**

CITS
9/10/13
Ex. D

# PUBLIC TRANSPORTATION IN INDIANA

## an analysis of ridership surveys


Analysis and Research by

Dagney Faulk, Ph.D. Michael Hicks, Ph.D. Kevin Kroll

Center for Business and Economic Research
Ball State University Muncie, Indiana
June 2012


BALL STATE UNIVERSITY.
CENTER FOR BUSINESS AND ECONOMIC RESEARCH

# EXECUTIVE SUMMARY

This report provides information on the characteristics of public transit riders in Indiana to provide an overview of who uses transit and for what purpose. We use data from ridership surveys to examine demographic characteristics of riders and rider satisfaction.

The public transit network in Indiana consists of 66 urban and rural public transit systems operating bus and light van passenger vehicles along with one commuter rail system.

In 2010 the transit systems in Indiana provided over 35.2 million passenger trips and logged more than 46.6 million vehicle miles. Operating revenue totaled $204.1 million. Of this total, $48.9 million (24 percent) was from state assistance primarily from the Public Mass Transportation Fund (PMTF) funded through the state sales tax.

## Fixed-Route Service

Fixed-route systems are defined by set routes and designated stops. Of the 18 cities with fixed-route systems, all but Muncie have shown increased ridership from 2006 to 2010.

In the seven fixed-route transit systems for which we have ridership survey data, more than 90 percent of those surveyed were between the ages of 18 and 65, of legal driving age.

Almost 70 percent of riders surveyed are transit dependent, meaning they do not have access to at least one car in their household.

Among survey respondents, 49 percent were in the lowest income bracket of their respective surveys, which was an annual household income below $10,000 or $15,000 depending on the survey. Only 9.6 percent of respondents' households have an annual income of over $50,000.

About a third of transit riders use the bus system more than 5 days per week. Over 80 percent of riders use the bus a minimum of 3 days per week.

Sixty percent of transit users described the primary purpose of their trip as being for either work or school.

We estimate that annual income tied to fixed-route bus transit in the state ranges from $436 million to $647 million for riders who use transit to get to work.

The typical fixed-route bus rider in Indiana is a 19-34 year old female, making less than $15,000 a year. She is likely to be transit dependent, using the bus 3-5 times or more per week. The trip is likely to be for either school or work.

Fixed-Route passengers are charged an average fee of $0.96 per ride among all the transit systems in Indiana. The six largest transit systems charge an average of $1.17 per trip.

## Demand-Response Systems

In total there are over 66 demand-response providers currently operating in Indiana (INDOT Public Transit Annual Report 2010). In rural areas these systems serve as a flexible transportation option in areas with small populations that cannot support a fixed-route service. Demand-response users are required to book trips in advance via telephone or internet.

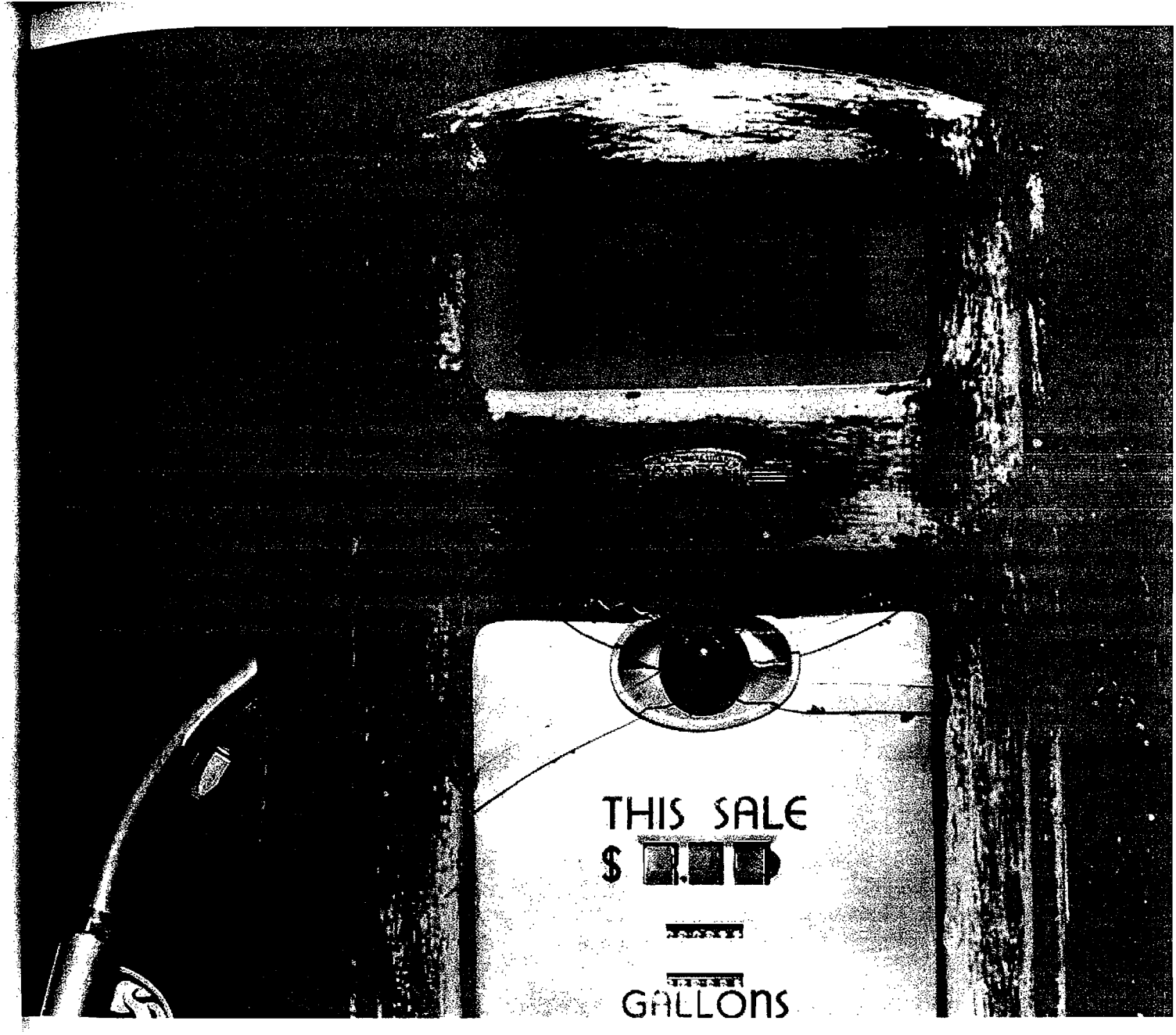
Total ridership for the five urban demand-response systems and 43 rural demand/response systems in Indiana totaled over 640,000 and 2 million, respectively in 2010. In addition, we estimate that there were more than one million demand-response riders in the 18 urban transit systems that have both fixed-route and demand-response transit.

Bloomington was the only system that collected ridership survey data for its demand-response service. In 2010 Bloomington's demand-response completed approximately 31,500 passenger trips. Direct response riders in Bloomington pay $2.00 per direction traveled.

The population demographics for demand-response service are typically very different from that of fixed-route. More than 50 percent of demand-response users in Bloomington were over the age of 75, and more than 70 percent were over the age of 60.

Income levels also differed, but not as much. There were 34 percent of riders in the lowest income bracket of under $10,000, while 87 percent made less than $40,000 per year. Less than 5 percent earned over $85,000 per year, the highest income bracket.

The most common trip purpose for demand-response riders are to get to medical appointments, to access community resources and to get to and from work.




# THE EFFECT OF GASOLINE PRICES ON PUBLIC BUS RIDERSHIP IN INDIANA

Analysis and Research by
Michael Hicks, Ph.D. - Dagney Faulk, Ph.D.

Center for Business and Economic Research
Ball State University, Muncie, Indiana
September 2012

BALL STATE UNIVERSITY
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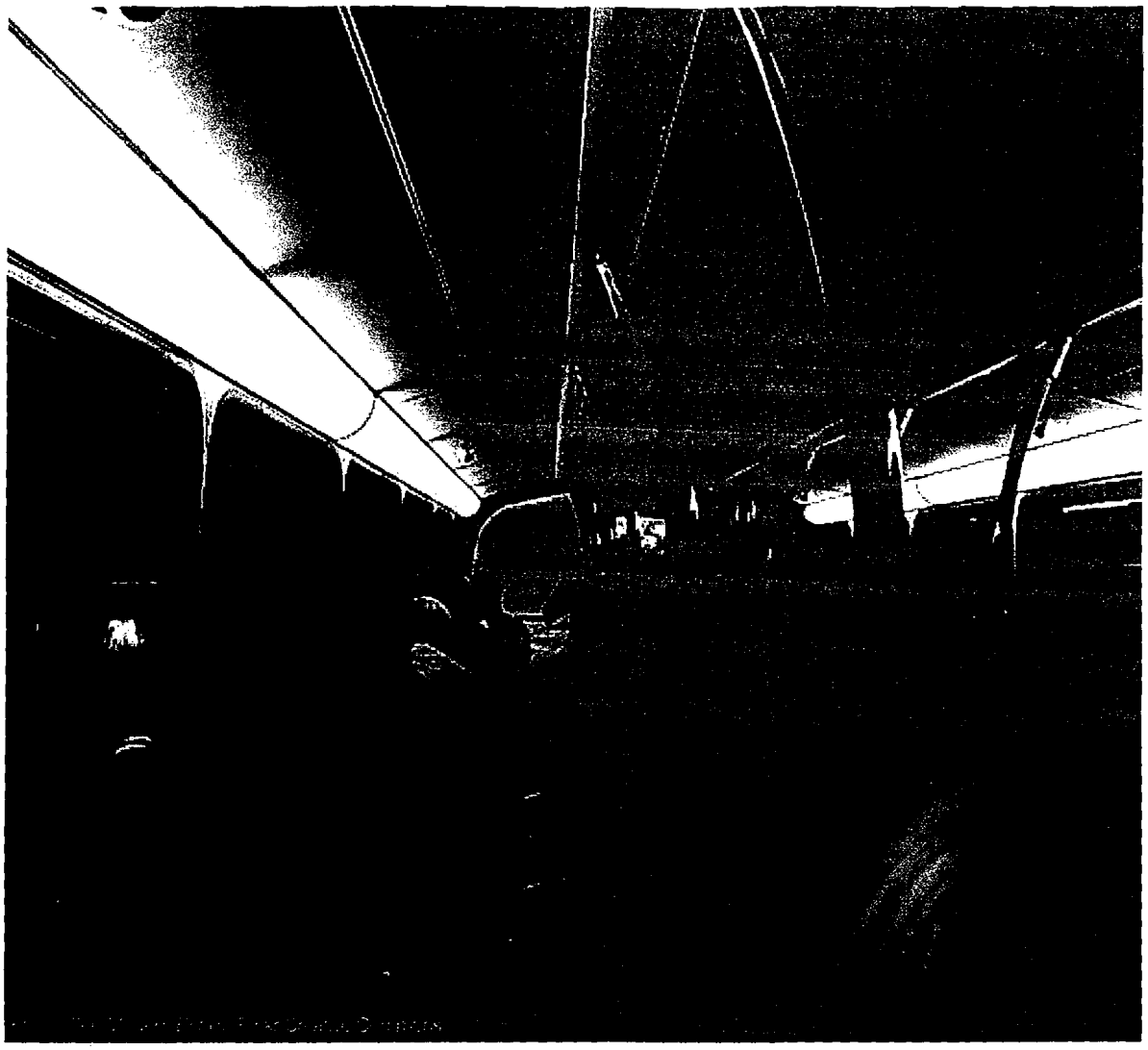

# EXECUTIVE SUMMARY

This study estimates the long-run and short-run effect of gasoline price changes on bus ridership in selected fixed route and demand response systems in Indiana from 2006 through 2011. We find that in the short run, a 10 percent increase in gasoline prices will increase fixed-route ridership by roughly 1.15 percent. This is an elasticity measure. Over the long run, a 10 percent increase in gasoline prices will lead to a roughly 3.4 percent increase in ridership. These findings are consistent with economic research that identifies long-run response to price changes is much higher than short-run response. We also find that demand-response riders are not sensitive to price changes in gasoline, a finding that was expected. We then simulated the effect of gas price changes on bus transportation demand over the coming decades, under three different scenarios. Under the high gasoline price scenario (at $5.00/gallon by 2035) we expect ridership on Indiana's bus system to triple to more than 90 million trips per year. Using long-run responsiveness and the Energy Information Administration's gasoline price forecast, we expect ridership to more than double to over 60 million riders by 2035. Using the EIA forecast and low price responsiveness we would expect ridership to rise by 50 percent to 44 million riders by 2035.

Research Sponsor

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Research and Analysis

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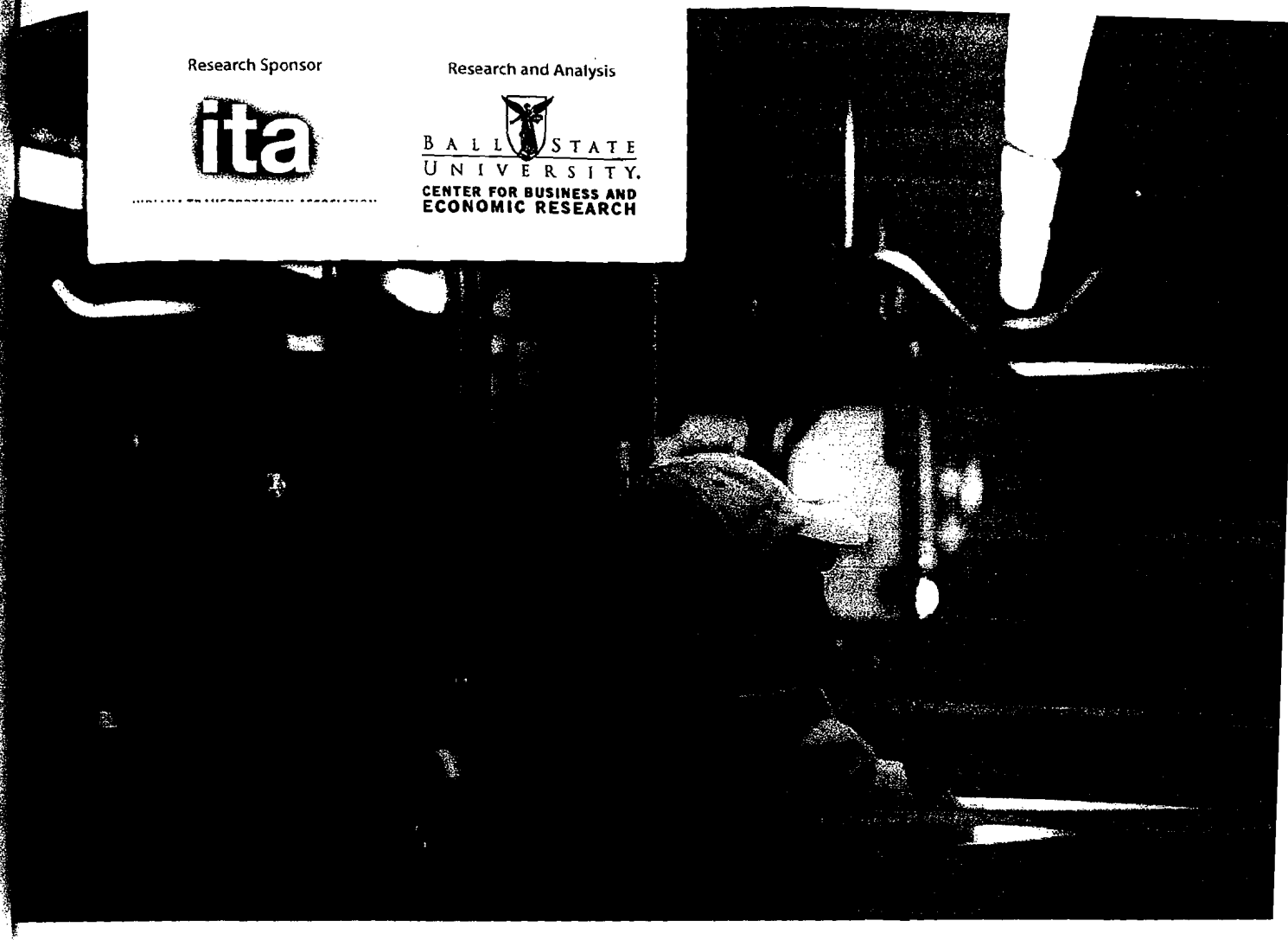
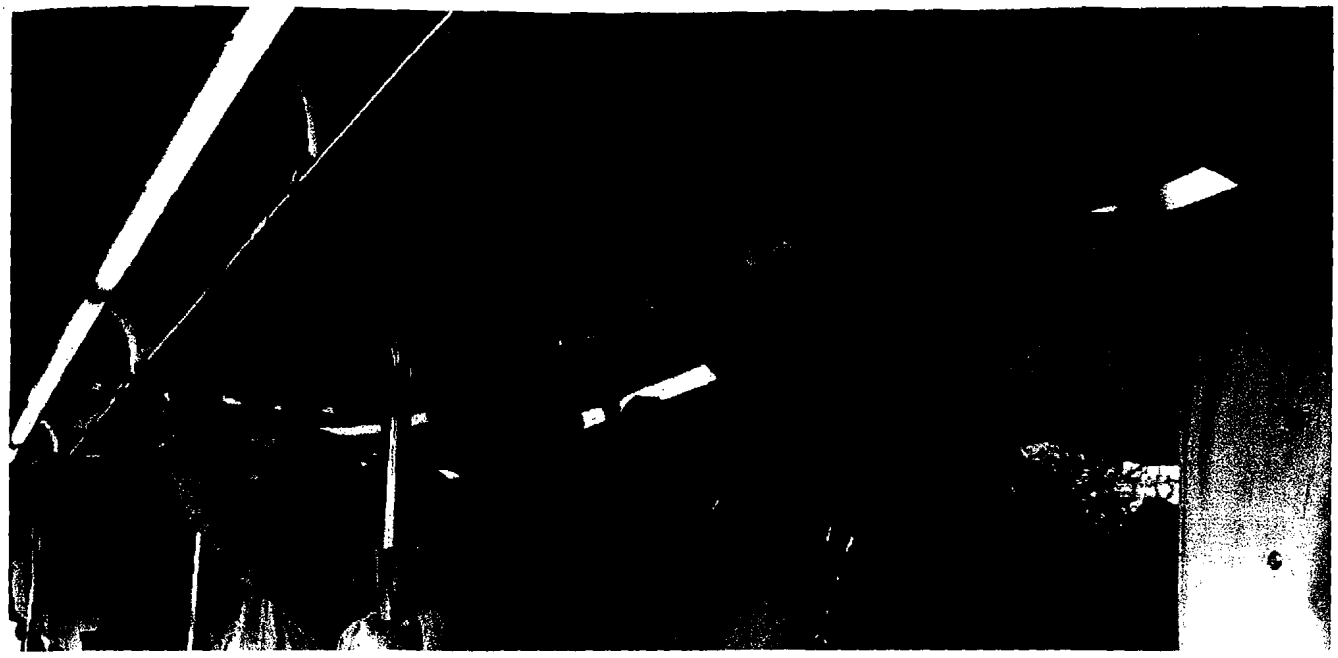


# Fixed-Route and Demand-Response Bus Systems:

## Financing Methods, Benefits, and Costs in Indiana

Michael J. Hicks, Dagney Faulk, and Kevin Kroll
Center for Business and Economic Research, Ball State University
January 2013



# Executive Summary

This study examines a number of policy considerations related to the financing of transit—primarily fixed-route and demand-response bus systems—within a federal system. We do so by first explaining the role of federal government, state and local government, and private financing of transportation from a theoretical perspective. Here, the idea of fiscal federalism will be explicitly linked to the provision of public transportation. We follow this with data and analysis on Indiana and other states that provide public transit at a similar scale and scope to Indiana. After examining the cost side of public transit, we explore the benefits of local fixed-route and demand-response bus systems. Here we discuss and analyze the benefits that occur, and to whom these benefits accrue. This motivates the next section, which compares these costs and benefits at each level of government. We end with a summary, conclusions, and policy considerations.

## Financing Public Transit

Total expenses for transit systems are borne by riders through fares and by local, state, and federal governments. Some fees are reimbursed through social service or Medicaid programs. The revenue sources and the method of disbursing revenues to transportation systems vary widely among states.

Indiana transit systems received a total of $184,665,627 in funding from all levels of government, which equals $28.75 per capita. Every state receives federal funding for transit. Indiana received $103,960,670 in federal transit funds or $16.19 per capita in 2009.

The federal government offers specialized funding through a variety of transit grants and programs through the Federal Transit Act (FTA). In 2009, Indiana received $17.8 million through various grant programs allocated through the Indiana Department of Transportation.

As of 2009, all states except Alabama, Hawaii, Arizona, Nevada, and Utah provided state funding for transit. Transit systems in Indiana received $55.5 million in state funding in 2009, $8.63 per capita.

Indiana accrues 90.5 percent of its state funding for public transit through the general sales tax (see *Table 2* in this report). Indiana uses a formula-based system based on passengers, vehicle miles traveled, locally derived income, and operating expenses to allocate funds through the Public Mass Transportation Fund (PMTF).

While the changes in PMTF funding over the years were meant to be revenue neutral, the expansion of the number of systems in the state has meant that some systems, particularly the fixed-route systems, have experienced declines in their share of state funding.

Transit is partially funded by local taxes in 34 states across the U.S. Indiana receives 88.5 percent of its local funding for transit through property taxes, with the rest coming from income, gasoline, and other taxes. Most other states receive the majority of their local transit funding from sales or property taxes.

In 2009, transit funding in Indiana totaled $223.6 million ($34.82 per capita), of which 17.4 percent was covered through fare revenue. In total fare revenue, Indiana transit systems received $38,991,477. Of that, 48.5 percent were from fixed-route bus systems across the state, which totals $18,912,408.

## Benefits and Costs of Public Transit

Riders benefit from the presence of transit services through its direct use, and indirectly from income, consumption, and public services made available by the presence of public transportation. Households without riders benefit as well through the reduction of congestion costs, lower levels of air pollutants, and reduced damage to highway infrastructure. Governments that support bus transit also accrue benefits. These include additional tax revenues from workers who can maintain employment due to access to a system. Similarly, costs in health care or social services that are reduced or eliminated through public bus service are a benefit to governments. Examples of this may be reduced Medicaid costs due to reduced levels of missed medical appointments, lower transportation costs for Medicare-reimbursed households, or reduced SNAP (food stamps) expenditures due to access to employment opportunities.

Our estimates here are limited to fixed-route bus systems. Our method involves calculating the predominant individual benefits of transportation. We separate benefits and costs by two groups: the public and private sectors. The public sector is primarily governments of all levels who provide transit revenue support, receive benefits in the form of reduced tax expenditures in other areas and receive increased tax revenues due to higher levels of economic activity. The private sector is made up of businesses and citizens who receive direct benefits due to access and use of bus transit, and indirect benefits such as congestion relief and improved environmental quality. In this process, we use conservative assumptions and categorize benefits into four categories: 1) public costs deferred or reduced through the presence of a fixed-route bus system, 2) miscellaneous private costs reduced through the presence of a fixed-route bus system, 3) private sector benefits of the system, 4) federal, state, and local tax revenues linked to a fixed-route bus system. These are compared to costs on a miles-traveled measure.

There are several types of costs deferred by state and local governments and by individuals as a consequence of the presence of bus transit. The most obvious of these are costs avoided by state, federal, and local governments and households as a consequence of the presence of a fixed-route bus system. These may include fixed costs such as the construction of a parking lot at a university or annual costs such as higher expenses associated with Medicaid travel reimbursement on demand-response systems.

For the purposes of this study, we employ conservative estimates of congestion and pollution costs and do not use carbon costs in this analysis. Our cost estimates are derived from secondary sources from well-respected analysts of transportation systems. As such, these estimates should be viewed as conservative.

The private sector also benefits directly from the presence of public transportation. The benefits include not only the avoided costs of operating a vehicle (which is not an option for all riders), but also a variety of costs to businesses and households avoided by the presence of public transportation systems. Our analysis finds that employee turnover in firms is significantly lower in counties that have access to a bus system.

Finally, tax revenues for local (LOIT), state (income and sales), and federal payroll taxes were derived from the previously mentioned microsimulations. These estimates omit changes to consumption patterns (e.g. less downtown shopping) or ancillary taxes and fees paid to federal, state, and local governments through incomes supported by the availability of public transit. Also, our simulation omitted all demand-side benefits of transit. We did not calculate the number of local businesses or commercial activity associated with the availability of bus transit.

Our benefit-cost estimates suggest that for each $1 of expenditure on public transit, more than $3 of benefit are realized. These costs and benefits are similar to those reported in other studies and represent the largest share of the benefits that can reasonably be estimated with currently available data. Quite clearly, the benefits of public fixed-route transit systems outweigh the costs for both taxpayers as a whole and those who ride the transit systems.

**Our benefit-cost estimates suggest that for each $1 of expenditure on public transit, more than $3 of benefit are realized.**

# The Impact of Bus Transit on Employee Turnover: Evidence from Quasi-Experimental Samples

March 4, 2013

Do Not Cite

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Prepared for the "Resilience and Rebuilding for Low-Income Communities: Research to Inform Policy and Practice" conference sponsored by the Federal Reserve System, April 11-12, 2013, Washington, D.C.

**Abstract**: This analysis investigates the relationship between fixed-route bus transit and employee turnover using data from quasi-experimental samples. We expect that counties with fixed-route bus transit will have lower turnover rates because transit offers an affordable means of transportation to workers without automobiles, allowing these workers to reach job sites. Panel regression models and county-level data from Illinois, Indiana, Michigan, Ohio, Pennsylvania and Wisconsin from 1998 through 2010 are used to test this hypothesis. We find that the size of the fixed-route bus system (measured as real per capita operating expenditures) is negatively related to employee turnover rates: An increase in bus systems' per capita operating expenditures is associated with a decrease in employee turnover. The implications of these results are that businesses receive benefits from public bus systems that should be further explored. Decreases in employee turnover represent cost savings to businesses by reducing the costs associated with training new workers and rebuilding firm-specific knowledge. These results suggest that access to fixed-route bus transit should be a component of the economic development strategy for low income communities not only for the access to jobs that it provides low-income workers but also for the benefit provided to businesses that hire these workers.

*Keywords:* Employee Turnover, Transit, Bus

*JEL Classification*: R42 - Government and Private Investment Analysis; R58 - Regional Development Policy; H54 - Infrastructures; Other Public Investment and Capital Stock; R11 - Regional Economic Activity: Growth, Development, and Changes; R49 Transportation Systems - Other

**Introduction**

The suburbanization of manufacturing and retail employment has had a dramatic impact on job accessibility for low-income individuals. For low-income workers access to transportation may limit the type and number of available jobs to which they have access. This would ultimately influence income levels, and the duration of employment. Economic literature has identified a spatial mismatch hypothesis suggesting that that geographic, racial (and income) segregation is a primary determinant of unemployment and poverty for many households. The residential location of households with available workers is distant from the location of available jobs which results in relatively high commuting costs associated with employment opportunities (Kain 1968). Public bus systems often fill this gap offering an affordable means of transportation for workers without access to automobiles to reach job sites.[1]

An important policy question is whether the jobs available to the urban poor suffer higher employee turnover rates due to lack of reliable transportation. The broader benefits of fixed-route public bus systems are not typically captured in standard cost-benefit analysis.[2] The benefits that public transit provides to businesses have received little attention from researchers. Decreases in employee turnover represent cost savings to businesses by reducing the costs associated with hiring and training new workers and rebuilding firm-specific knowledge.[3] Costs associated with training new workers are estimated to be a significant share of annual employment costs (Tziner

[1] Research in the planning and urban studies literature suggests transportation access plays a role in employee turnover. See Blumenberg and Manville, 2004; Kawabata, 2003; Sawicki and Moody, 2000 and Ong and Blumenburg, 1998.

[2] Hicks, Faulk and Kroll (2013) include estimates of reduced costs associated with lower employee turnover in the benefit-cost analysis they perform for Indiana fixed-route bus systems.

[3] Turnover costs include both direct and indirect costs (Boushey and Glyn 2012, HBE 2002, Branham 2001). Direct costs include separation costs, severance pay, higher unemployment taxes, overtime for other staff or temporary staffing to cover former employees duties, advertising, search and agency fees, screening applicants, interviewing, background checks, testing, applicant travel and relocation costs, and training costs. Indirect costs are more difficult to measure and include lost productivity, reduced quality, errors or waste as new employee learns job, reduced morale, lost clients and lost institutional knowledge, customer service disruption.

and Birati 1996). In their review of case studies and research papers estimating costs associated with turnover, Boushey and Glynn (2012) find that turnover costs are 20 percent of salary for most workers, but can be considerably higher for jobs that require specialized skills and training, and higher levels of education. The objective of this analysis was to examine whether access to public transit had discernible impact on employee turnover in firms.

This research contributes to the literature in the following ways. First, we examine how public transit benefits employers. Previous research has examined the benefit of transit from the worker's perspective, particularly welfare recipients. Second, this study explicitly examines the role of fixed-route bus transit in employment outcomes. Most other studies have not differentiated between rail and bus. Fixed-route bus transit can be adjusted to serve new or growing industrial parks or retail centers so that over time bus transit is more flexible than rail transit. Finally, we examine the impact of transit in small metropolitan areas. Previous research has focused primarily on large metropolitan areas.

The remainder of the paper is organized as follows: The next section provides a brief review of the literature related public transit and employment. The third section introduces the modeling strategy that we use to investigate the impact of transit on employee turnover. The fourth section describes the data and samples used in the analysis followed by a discussion of the results. The final section provides conclusions and implications.

**Literature**

Studies examining the relationship between employment outcomes and public transit have focused on job accessibility. Several studies have focused on the benefits that public transit provides to welfare recipients. The findings vary with some studies finding that transit has a positive impact on employment while other studies find no association. Sanchez, Shen and Peng (2004) examine the relationship between transit access and employment status of TANF recipients in six large metropolitan

areas and find that access to fixed-route transit and employment concentrations has no association with employment outcomes. Bania, Leete and Coulton (2008) come to a similar conclusion in their examination of job access and employment outcomes for welfare recipients in Cleveland, Ohio. Studies such as Sanchez (1999) find that transit access (bus and rail) is a significant determinant of labor force participation in Atlanta and Portland. Kawabata (2003) found that transit-based job accessibility increased the employment probability for low-skill workers without automobiles in Los Angeles and San Francisco, California but not Boston.

Other studies have focused on broader impacts of transit. Faulk and Hicks (2010) find that counties with bus systems have lower unemployment rates, lower growth in food stamp payments and higher population and employment growth relative to counties without bus systems but no impact on income which they suggest is due to supply side effect in the labor market.

A few studies examined how investment in transportation affects factor (labor and capital) productivity. Venables (2007) showed that transportation investment leads to higher levels of employment which generates higher productivity due to the external benefits (agglomeration externalities) -- improved links between firms and increased employment densities -- associated with higher levels of employment. Graham (2007) extended this analysis to estimate the impact of increased employment density on productivity and estimated urbanization elasticities of 0.129 economy wide, 0.07 for manufacturing and 0.197 for service sectors. These studies focused on transportation investment generally not bus transit specifically, but implications of these studies are that if transit does increase employment density, there are external benefits that are not usually quantified in cost benefit studies related to transit.

Empirical literature linking job turnover to transit availability is sparse. While there are a significant number of anecdotal and case study analyses which identify job turnover with transportation availability, other than forming a hypothesis, these studies do not shed light on the empirics of the issue.

**Modeling Strategy and Econometric Considerations**

Our approach is to use panel regression models to examine the effects of transit on employee turnover in firms. In the model, we control for the size of the transit system and county (cross section) fixed effects which take into account differences among counties that do not vary over time. The full model takes the following form:

$$\overline{T_{it}} = \alpha + \beta_{1it}A + \beta_{2it}L + \beta_{3it}I + \varphi t + \theta\delta_{t-1} + \gamma_i + \varepsilon_{it} \qquad (1)$$

Where $T_{it}$ is the average employee turnover rate in county $i$ in year $t$. The full model specifies employee turnover as a function of an intercept, access to public transit, labor market characteristics, industry characteristics, a time trend, autoregressive terms, cross-section (county fixed effects dummies) and a white noise error term. We estimate several variations of this basic specification to ensure the robustness of our results. These successively include an autoregressive and cross sectional fixed effects, initially with only the bus access variable, and then each of the additional variables described below.

Our measure of access to bus transit is real operating cost per capita. Higher operating expenses indicate that a bus system covers more territory or has more frequent coverage of existing routes both of which increase the availability of transit to potential users. We expect counties with larger bus systems to have lower employee turnover rates because transit dependent workers will be able to use transit to get to work. This approach requires controls for other factors which may influence job turnovers.

Employee turnover rates are also related to labor market conditions in a county particularly the availability of jobs. The unemployment rate is a measure of workers potentially available for employment. When the unemployment rate is low, workers can easily change jobs, whereas when the unemployment rate is high, finding a different job is more difficult. We expected the employee turnover to be negatively related to the unemployment rate.

The share of employment in manufacturing in a county and the share of employment in retail control for county level differences in industrial composition. We view this solely as a control variable within this sample.

We expect there to be a positive relationship between the retail share of employment and the employee turnover rate. Since retail employment is predominantly part-time, workers have a weaker attachment to jobs (Tilly 2008). As the retail share of total employment increases, we expect the turnover rate to increase.

The average manufacturing wage and the average retail wage are measures of labor costs and labor productivity. Higher productivity is reflected in higher wages. We expect there to be a negative relationship between employee turnover rates and average wages. The turnover rate decreases as the wage increases.

We also face some econometric considerations which are worthy of mentioning. We consider few conditions in which endogeneity between our main regressor and job turnover would be readily apparent. While poverty or low educational attainment may be endogenous to public financing of bus transit, we can see no such transmission mechanism for job turnover from transit, and so assume exogeneity. Spatial dependence across the sampled cities might appear an obvious concern. However, the a few exceptions the treatment group of the samples are non-conterminous, and so we treat these as independent observations cross sectionally.

**Data and Sampling Method**

We investigate the relationship between public transit accessibility and employee turnover in counties with small cities. We construct two samples of counties with and without public fixed-route bus systems. The treatment group is counties with fixed-route bus systems during at least one year of the study period, populations between 50,000 and 125,000 in 1950

and cities with boundaries primarily in one county and includes the same counties in each of the two samples. The control group is counties without fixed-route bus systems and is constructed using the NEG method or the propensity score. Counties with rail transit are excluded from the sample.

The first control group is constructed using a nonequivalent group design (NEG) of the type presented by Reed and Rogers (2003), Hicks (2003). In these articles, univariate comparisons between the treatment and control groups are performed. We extended this approach conducting a multivariate scoring process on two time varying samples in which bus service was offered (Faulk and Hicks 2010). This process was designed to limit threat to internal validity of the selection by including a time period prior to federal subsidization of municipal bus service. In this approach we selected a control sample by matching all non-treatment counties on most proximal personal income, per capita income, total employment and growth in each of these variables. Each county was scored on each attribute and a control sample selected from the highest scoring counties. These counties qualified for inclusion into the NEG as they demonstrated the most similar set of economic characteristics from a period extending more than a decade prior to through the end of the study period. This provides a control group of counties that are most similar, but without a transit system.

The second control group is constructed using propensity score matching. The propensity score matching model uses 1970 county characteristics to estimate the influence of specific factors on the probability that a county will have bus transit during the study period. The propensity score estimates the likelihood that any county will have bus transit based on the characteristics of counties that actually have transit. Matching counties based on the likelihood that they have bus transit should control for the factors that predisposed particular counties to

have bus transit. Using this method, each county with transit is matched to the county with the nearest propensity score that does not have transit.

We limit our analysis to counties in the upper Midwest (Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin) to examine the relationship between bus transit and employee turnover. We limit analysis to this region to control, in part, for regional differences in local government structure, industrial composition and cost of living differences. This is the rustbelt region of the United States and is a relatively homogenous region from which to evaluate effects of public transportation systems. Ideally, municipal data or data associated with the geography of a transit area would be used. However, since a limited number of variables are available for cities or transit areas, the county in which the city or transit area is located is the unit of analysis in this study.

The dataset is an unbalanced panel due to differing start dates of the Quarterly Workforce Indicators in each state but spans 1998 to 2010 for the longest time series. The years for which we have data for each state are shown in appendix table 1.

We use county-level data from Census. BEA's regional economic database and BEA's Quarterly Workforce Indicators (QWI) to examine the impact of bus access (measured as real operating expenses on fixed-route bus systems in a county) and employee turnover. We use data from the National Transit Database to aggregate data on fixed-route bus systems to the county level. Real operating expenses per capita ranges from $0 to $56. Per capita real operating expenditures averaged $11.02. Descriptive statistics are shown in table 2.

**Results**

Tables 3 and 4 show the results of the regression analysis. Table 3 shows the results for counties with small cities that have bus transit and a control group developed using the NEG technique described above. Table 4 shows the results for the sample using propensity score matching.

Results from the NEG small cities samples show that employee turnover rates are lower in counties with bus transit. The coefficients range from -0.02 to -0.05 among the five models estimated. This is a modest but not immaterial impact on turnover indicating that access to bus transit reduces employee turnover. An additional $10 per capita expenditure on bus transit would reduce turnover by just 0.29 percentage points (models 4 and 5).

Results for the propensity score sample are similar -- employee turnover rates are significantly and negatively related to access to bus transit. A dollar increase in per capita operating expenditures for a bus system decreases employee turnover by 0.03 to 0.05 percentage points.

The other estimation results are also important to confirm the overall usefulness of the models. In particular, inverse relationship between turnover and unemployment rate held across both samples and all specifications indicating that employee turnover rates increase as the unemployment rate decreases. This was anticipated following a long body of research beginning with Dow and Dicks-Mireaux (1958). A lower unemployment indicates that it is easier for a worker to find another job.

The control variable of manufacturing share was negative and highly significant, while retail share was positive and significant. These variables control for variation in industrial structures in the samples. As the manufacturing share of total employment increases, the turnover rate decreases. The retail share of employment is positively related to the employee turnover rate in a county. Because retail employment is often part time, workers in this sector often don't have a strong attachment to employers which explains the increasing turnover rate.

There are differences in the average earnings results between these two samples. In the propensity score sample average manufacturing earnings is a negative and statistically significant determinant of the employee turnover rate indicating that a dollar increase in average manufacturing earnings decreases employee turnover by 0.098 percentage points. The results suggest that higher earnings in this sector decrease employee turnover. In the NEG sample average manufacturing earnings is negative but not significant in two of the three models in which this variable is included. In the propensity score sample, as average retail earnings is positively related to the turnover rate, although the effect is very small. In the NEG sample the relationship between average retail earnings and the turnover rate is negative and not consistently significant. The high proportion of part-time workers and variability in average wages are likely driving these different results. The descriptive statistics (table 2) show that variation in average retail earnings in counties without transit is much higher in the propensity score sample than the NEG sample.

The recession dummy is also positive and significant in the propensity score sample indicating that turnover is higher in recession years, and positive and close to significant for the NEG sample. This result is likely related to higher levels of involuntary turnover during recessions.

*The Impact of Transit on Employee Turnover Costs*

The results of the regression analysis suggest that employee turnover decreases by 0.02 to 0.03 percentage points for each dollar increase in per capita operating expenditures on transit. We use these results to estimate the impact of transit on employee turnover costs for manufacturing and retail employees. In their review of the literature Boushey and Glynn (2012) find that turnover cost is 16% of an employee's annual salary among positions earning $30,000 or less. In counties with transit in our six-state study region, average manufacturing earnings is approximately $30,000 per year and average retail earnings is approximately $11,500 per year.

The availability of fixed-route public transportation reduced employee turnover in manufacturing by 1,100 to 1,200 workers per year over the study period in counties with small cities within the six-state region included in this sample. The associated reduction in manufacturing turnover costs is $5.3 million to $6.1 million per year. The availability of transit reduces retail turnover by 900 to 1000 workers. The reduction in turnover costs is $1.7 to $1.9 million.

**Conclusion**

This paper reports the results of a straightforward test of the role of transportation access on employee turnover at the county level from two samples of U.S. counties from 1998 through 2010. The samples include the same counties with transit (treatment group) but different counties without transit (control groups). The two control groups are constructed using the nonequivalent (NEG) design technique and propensity score matching. In both samples we find that measures of the size of the fixed-route transit system (real per capita operating expenditures) effects employee turnover in the county: An increase in bus systems' per capita operating expenditures is associated with a decrease in employee turnover. We also find that lower unemployment rates similarly affects turnover, which we view as confirmation of the ability of our model to tease out readily expected outcomes in these samples. We also find industrial structure influences turnover as evidenced by our control variables for the share of manufacturing and retail in each county.

The implications of these results are that businesses receive benefits from public bus systems that should be further explored. Decreases in employee turnover represent cost savings to businesses by reducing the costs associated with training new workers and rebuilding firm-specific knowledge. These results suggest that access to fixed-route bus transit should be a component of the economic development strategy for low income communities not only for the access to jobs that it provides low-income workers but also for the benefit provided to businesses that hire these workers.

Despite what we view as robust and non-trivial findings, we believe that much additional exploration is needed. Studies of individual rider behavior which estimate the role access to transportation plays in the propensity to work would be an ideal addition to this literature. Likewise, other measure of firm performance and bus access, such as job tenure and location decisions are warranted.

**Table 1: Variables definitions and sources**

| Variable | Definition or Calculation | Source |
|---|---|---|
| Average Turnover Rate | Average of quarterly employee turnover rate in a county | Quarterly Workforce Indicators |
| Per Capita Real Operating Expenditures (proxy for size of fixed-route bus system) | Total real operating expenses for the fixed-route bus systems in a county adjusted for inflation divided by population | National Transit Database |
| Unemployment rate (%) (proxy for labor market conditions) | Percentage of the labor force that is unemployed in county *i* | Bureau of Labor Statistics |
| Manufacturing share of total employment (%) | Manufacturing employment divided by total employment | Bureau of Economic Analysis |
| Average manufacturing earnings (Real $) | Manufacturing earnings divided by the number of manufacturing workers adjusted for inflation. | Bureau of Economic Analysis |
| Retail share of total employment (%) | Retail employment divided by total employment | Bureau of Economic Analysis |
| Average retail earnings (Real $) | Retail earnings divided by the number of retail workers adjusted for inflation | Bureau of Economic Analysis |
| Recession Dummy | =1 if year is 2001, 2008 or 2009<br>=0 otherwise | National Bureau of Economic Research |

**Table 2: Descriptive Statistics**

| | Small Cities Sample 1: Nonequivalent Group Design | | | Small Cities Sample 2: Propensity Score | | |
|---|---|---|---|---|---|---|
| **TOTAL** | **Mean** | **Std. Dev.** | **Obs** | **Mean** | **Std. Dev.** | **Obs** |
| Average Turnover Rate (%) | 8.70 | 1.19 | 939 | 8.65 | 1.25 | 931 |
| Per Capita Real Operating Expenditures (Fixed-route bus system) | 5.67 | 8.65 | 939 | 5.72 | 8.67 | 931 |
| Unemployment rate (%) | 6.20 | 2.57 | 939 | 6.34 | 2.65 | 931 |
| Manufacturing share of total employment (%) | 17.58 | 7.73 | 936 | 18.03 | 8.37 | 921 |
| Average manufacturing earnings (Real $) | 29,056 | 6,503 | 935 | 29,011 | 6,318 | 921 |
| Retail share of total employment (%) | 13.00 | 3.10 | 935 | 12.85 | 3.00 | 921 |
| Average retail earnings (Real $) | 11,200 | 1,262 | 935 | 11,545 | 3,584 | 921 |
| Recession Dummy | 0.25 | 0.43 | 935 | 0.25 | 0.43 | 921 |
| **without fixed route bus systems** | **Mean** | **Std. Dev.** | **Obs** | **Mean** | **Std. Dev.** | **Obs** |
| Average Turnover Rate | 8.55 | 1.15 | 456 | 8.45 | 1.26 | 448 |
| Per Capita Real Operating Expenses (Fixed-route bus system) | 0 | 0 | 456 | 0 | 0 | 448 |
| Unemployment rate (%) | 6.41 | 2.53 | 456 | 6.72 | 2.67 | 448 |
| Manufacturing share of total employment (%) | 19.38 | 7.87 | 453 | 20.38 | 8.94 | 438 |
| Average manufacturing earnings (Real $) | 27,213 | 6,673 | 452 | 27,058 | 6,256 | 438 |
| Retail share of total employment (%) | 12.86 | 3.18 | 452 | 12.55 | 2.94 | 438 |
| Average retail earnings (Real $) | 10,840 | 1,389 | 452 | 11,554 | 5,089 | 438 |
| Recession Dummy | 0.25 | 0.43 | 452 | 0.26 | 0.44 | 438 |
| **with fixed route bus systems** | **Mean** | **Std. Dev.** | **Obs** | **Mean** | **Std. Dev.** | **Obs** |
| Average Turnover Rate | 8.84 | 1.22 | 483 | 8.84 | 1.22 | 483 |
| Per Capita Real Operating Expenses (Fixed-route bus system) | 11.02 | 9.30 | 483 | 11.02 | 9.30 | 483 |
| Unemployment rate (%) | 6.00 | 2.59 | 483 | 6.00 | 2.59 | 483 |
| Manufacturing share of total employment (%) | 15.90 | 7.20 | 483 | 15.90 | 7.20 | 483 |
| Average manufacturing earnings (Real $) | 30,782 | 5,840 | 483 | 30,782 | 5,840 | 483 |
| Retail share of total employment (%) | 13.13 | 3.02 | 483 | 13.13 | 3.02 | 483 |
| Average retail earnings (Real $) | 11,537 | 1,022 | 483 | 11,537 | 1,022 | 483 |
| Recession Dummy | 0.25 | 0.43 | 483 | 0.25 | 0.43 | 483 |

**Table 3: Results, Midwest small cities sample (AB sample)**

| Variable | Model 1 Coefficient [p-value] | Model 2 Coefficient [p-value] | Model 3 Coefficient [p-value] | Model 4 Coefficient [p-value] | Model 5 Coefficient [p-value] |
|---|---|---|---|---|---|
| | | | | | |
| Constant | 9.6879*** [0.0000] | 10.1858*** [0.0000] | 12.7276*** [0.0000] | 13.0147*** [0.0000] | 12.6259*** [0.0000] |
| Per Capita Real Operating Expenditures (Fixed-route bus system) | -0.0413*** [0.0082] | -0.0519*** [0.0007] | -0.0403*** [0.0055] | -0.0296** [0.0299] | -0.0293** [0.0345] |
| Unemployment rate | .. | -0.1623*** [0.0000] | -0.1928*** [0.0000] | -0.2021*** [0.0000] | -0.2092*** [0.0000] |
| Manufacturing share of total employment | .. | .. | -0.0934*** [0.0002] | -0.1096*** [0.0000] | -0.1117*** [0.0000] |
| Average manufacturing earnings (Real) | .. | .. | -1.79E-05* [0.0779] | -8.30E-06 [0.4281] | -6.29E-06 [0.5478] |
| Retail share of total employment | .. | .. | .. | 0.0643*** [0.0036] | 0.0774*** [0.0013] |
| Average retail earnings (Real) | .. | .. | .. | -0.0001* [0.0540] | -8.82E-05 [0.1263] |
| Recession Dummy | | | | .. | 0.1189 [0.1043] |
| Time Trend | -0.1219*** [0.0000] | -0.0347** [0.0140] | -0.0751*** [0.0000] | -0.0618*** [0.0014] | -0.0584*** [0.0030] |
| AR(1) | 0.2638*** [0.0000] | 0.2778*** [0.0001] | 0.2340*** [0.0009] | 0.2301*** [0.0020] | 0.2259*** [0.0032] |
| | | | | | |
| Obs. | 861 | 861 | 857 | 855 | 855 |
| Adj. R-sq. | 0.608 | 0.6497 | 0.6599 | 0.6734 | 0.675 |
| F-stat | 17.70*** | 20.70*** | 21.01*** | 21.72*** | 21.62*** |
| Durbin-Watson | 2.044 | 2.056 | 2.046 | 2.093 | 2.084 |

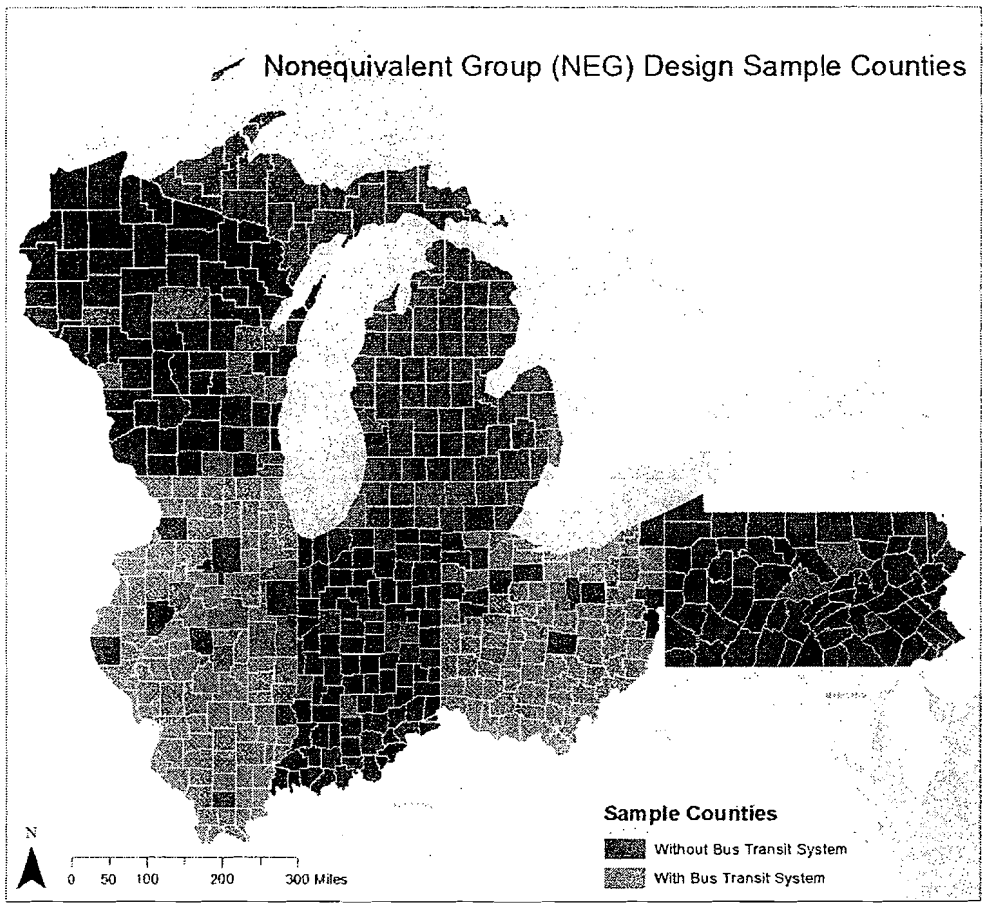
*** 0.01 level of significance, **0.05 level of significance, *0.1 level of significance

**Table 4: Results, Midwest small cities sample (propensity score sample)**

| Variable | Model 1 Coefficient [p-value] | Model 2 Coefficient [p-value] | Model 3 Coefficient [p-value] | Model 4 Coefficient [p-value] | Model 5 Coefficient [p-value] |
|---|---|---|---|---|---|
| | | | | | |
| Constant | 9.6210*** [0.000] | 10.1507 [0.000] | 13.0603*** [0.000] | 11.3374*** [0.000] | 10.9243*** [0.000] |
| Per Capita Real Operating Expenditures (Fixed-route bus system) | -0.0427*** [0.006] | -0.0538*** [0.0004] | -0.0421*** [0.0037] | -0.0335** [0.0156] | -0.0331** [0.0190] |
| Unemployment rate | .. | -0.1666 [0.000] | -0.2062*** [0.000] | -0.2150*** [0.000] | -0.2235*** [0.000] |
| Manufacturing share of total employment | .. | .. | -0.0889*** [0.0002] | -0.0967*** [0.0001] | -0.0976*** [0.0001] |
| Average manufacturing earnings (Real) | .. | .. | -3.12E-05** [0.0103] | -2.80E-05** [0.0197] | -2.16E-05* [0.0709] |
| Retail share of total employment | .. | .. | .. | 0.0807*** [0.000] | 0.0950*** [0.000] |
| Average retail earnings (Real) | .. | .. | .. | 5.19E-05*** [0.0002] | 5.65E-05*** [0.000] |
| Recession Dummy | .. | .. | .. | .. | 0.1490** [0.0339] |
| Time Trend | -0.1196*** [0.000] | -0.0297 [0.0367] | -0.0637*** [0.0002] | -0.0398** [0.0225] | -0.0359** [0.0417] |
| AR(1) | 0.2635*** [0.000] | 0.276309 [0.000] | 0.2341*** [0.0005] | 0.2235*** [0.0011] | 0.2221*** [0.0016] |
| | | | | | |
| Obs. | 853 | 853 | 839 | 839 | 839 |
| Adj. R-sq. | 0.621 | 0.664 | 0.672 | 0.682 | 0.684 |
| F-stat | 18.48*** | 21.81*** | 21.74*** | 22.19*** | 22.18*** |
| Durbin-Watson | 2.069 | 2.094 | 2.089 | 2.115 | 2.109 |

*** 0.01 level of significance, **0.05 level of significance, *0.1 level of significance

Fig


Nonequivalent Group (NEG) Design Sample Counties
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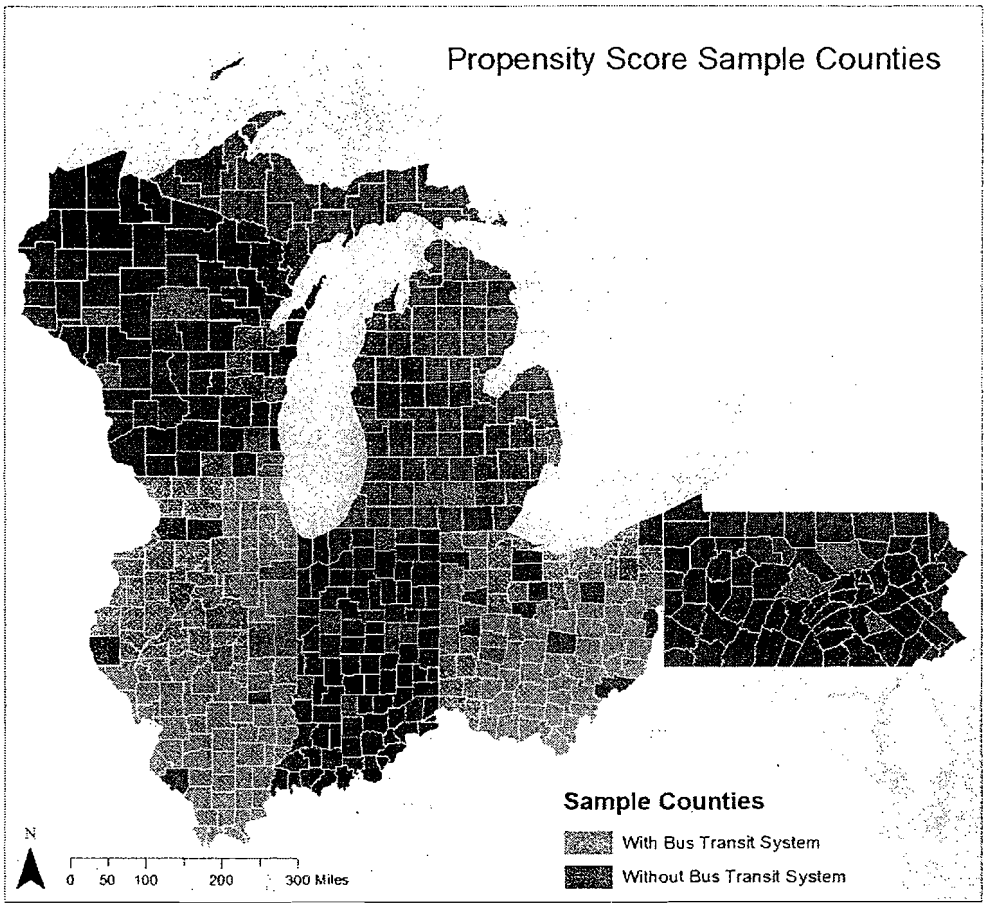
Sample Counties
Without Bus Transit System
With Bus Transit System

Fig


Propensity Score Sample Counties
Sample Counties
With Bus Transit System
Without Bus Transit System
N
0 50 100 200 300 Miles

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## Appendix

Table A1. State and years included in panel.

| State | First year of data included in dataset |
|---|---|
| Illinois | 1998 |
| Indiana | 1999 |
| Michigan | 2001 |
| Ohio | 2000 |
| Pennsylvania | 1998 |
| Wisconsin | 1998 |

Table 3. Counties with bus systems

| FIPS | County | State |
|---|---|---|
| 17019 | Champaign | IL |
| 17091 | Kankakee | IL |
| 17113 | McLean | IL |
| 17115 | Macon | IL |
| 17143 | Peoria | IL |
| 17183 | Vermilion | IL |
| 18035 | Delaware | IN |
| 18039 | Elkhart | IN |
| 18095 | Madison | IN |
| 18105 | Monroe | IN |
| 18157 | Tippecanoe | IN |
| 18167 | Vigo | IN |
| 26017 | Bay | MI |
| 26021 | Berrien | MI |
| 26025 | Calhoun | MI |
| 26075 | Jackson | MI |
| 26121 | Muskegon | MI |
| 26147 | St. Clair | MI |
| 39003 | Allen | OH |
| 39023 | Clark | OH |
| 39081 | Jefferson | OH |
| 39089 | Licking | OH |
| 39133 | Portage | OH |
| 39139 | Richland | OH |
| 42027 | Centre | PA |
| 42075 | Lebanon | PA |
| 42081 | Lycoming | PA |

| | | |
|---|---|---|
| 55009 | Brown | WI |
| 55035 | Eau Claire | WI |
| 55039 | Fond du Lac | WI |
| 55059 | Kenosha | WI |
| 55063 | La Crosse | WI |
| 55073 | Marathon | WI |
| 55087 | Outagamie | WI |
| 55101 | Racine | WI |
| 55105 | Rock | WI |
| 55117 | Sheboygan | WI |
| 55133 | Waukesha | WI |
| 55139 | Winnebago | WI |

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# The Economic Effects of Bus Transit in Small Cities

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## Abstract

This analysis investigates the impact of public transit in counties with small to medium-sized cities. The objectives are to answer: Do counties with bus transit have lower growth in transfer payments such as food stamps, Temporary Aid to Needy Families (TANF), or higher income growth, employment growth, and population growth? Public transit is commonly viewed as a social service; this analysis explores the economic impact of this public investment. The authors find that relative to counties without bus transit, counties with bus systems have significantly lower unemployment rates, lower growth in family assistance, lower growth in food stamp payments, and higher population and employment growth. Yet, the positive impact on job access, which reduces payments for family assistance and food stamps is tempered by lack of discernable effects on income likely driven by supply-side effects in the labor market.

## Keywords

employment, transit, bus, spatial mismatch

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## Introduction

For individuals, particularly low-income individuals, access to transportation may determine the number and types of available jobs to which they have access and ultimately income levels. The spatial mismatch hypothesis suggests that geographic racial (and income) segregation is a primary determinant of unemployment and poverty, particularly for minorities. The residential location of available workers is often far from the location of available jobs, which results in relatively high commuting costs associated with moving low-income workers between residential areas and job opportunities (Kain 1968).

Much of the research related to the spatial mismatch hypothesis has focused on large metropolitan areas. While smaller cities exhibit patterns of racial and/or income segregation in residential areas, the smaller size of these cities may mean that jobs are more accessible. Ihlanfeldt and Sjoquist (1990) show that spatial mismatch is more pronounced in larger metro areas and that this theory explains 14 percent of the employment gap for youths in medium-sized cities versus 25 percent in large cities. This finding suggests that access to transportation will have a differential impact in cities of different sizes. Despite the long-standing interest in this issue, little research has explicitly examined the relationship between transit and economic outcomes in small and medium-sized cities.

In this analysis, we use three carefully constructed samples of counties with small and medium-sized cities in the upper Midwest (Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin) for the 1992–2006 period to examine the relationship between transportation, particularly bus transit, and various measures of economic development. We limit analysis to this region to control, in part, for regional differences in local government structure, industrial composition, and cost of living differences.[1] This is the rustbelt region of the United States and is a relatively homogenous region from which to evaluate effects of public transportation systems. Since a limited number of variables are available for cities, the county in which the city is located is the focus of analysis in this study. Of the counties in the data set, thirty-nine had a bus system in 2006. Bus systems commenced operations in six of these counties during the 1992–2006 period. The presence and absence of public transit in counties of this size provide a framework to examine the impact of public transit. In the counties included in this study, transit is primarily fixed-route bus systems.

Since the early 1970s, federal, state, and local governments have invested in public transit systems.[2] In 2006, these governments provided

just over $27 billion in capital and operating funds to public transit systems in the United States (33.9 percent of transit expenditures were from local government).[3] Public transit systems are highly subsidized. The federal government generally funds 80 percent of capital expenditures with a 20 percent local match, and only a small portion of capital and operating funds are generated by the transit system primarily through fares, advertising fees, and taxes imposed by the transit authority or revenue from a municipality's general fund.[4]

More generally, the literature on infrastructure investment shows that at the national level, investment in infrastructure capital is positively related to productivity growth. See Gramlich (1994) for a review essay. Holtz-Eakin (1994) examines the relationship between public sector capital and productivity growth at the state level and finds no relationship. However, studies examining local infrastructure investment and economic growth find a strong positive relationship (Eberts 1991). Public transit infrastructure is one component of infrastructure capital.

This research contributes to the literature in the following ways. First, this study focuses on the impact of fixed-route? bus systems. Previous literature has examined fixed-route? rail systems. Second, we examine how public transit is related to economic development, including key labor market variables and measures of socioeconomic well-being, in small to mid-sized communities. Previous research has focused primarily on large metropolitan areas. In addition, we conduct separate analysis for two types of communities—those opening bus systems over the study period and all communities with bus systems (including those opening bus systems)—which provide some information on the short- and long-term impacts of transit.

The remainder of the article is organized as follows. The next section provides a review of the literature related to the economic development impact of public transit systems. The third section provides a brief description of transit funding and usage in the cities considered in this analysis. The fourth section describes our modeling strategy. The fifth section provides an overview of the data used in the analysis. The penultimate section discusses results. The final section offers a summary and conclusions.

## The Literature

Much of the literature examining the relationship between transit and economic development focuses on highways or rail transit. Few studies examine fixed-route bus transit and its impact on economic development or various socioeconomic indicators related to labor markets or antipoverty

expenditures. In his review of public transportation policies from 1960 to 2000, Sanchez (2008, 840) concludes that we know little about the impact that public transportation policies have on "creating opportunity or improving the well-being of families in the grip of poverty." We provide a review of the general literature on mass transit and economic development and the literature addressing transit and low-income populations. If transit has a positive impact on traditional economic development indicators, the low-income population is expected to benefit.

## *Transit and Economic Development*

The studies examining the relationship between transit and economic development focus primarily on fixed-route? rail transit systems in large cities. Bollinger and Ihlanfeldt (1997) find that while the presence of a Metropolitan Atlanta Rapid Transit Authority on 1st reference (MARTA) station had no impact on employment or earnings in the area around the station, it did alter the composition of employment increasing government employment proximate to stations.

There are a variety of studies looking at the relationship between rail stations and property values. One of the most rigorous is Bowes and Ihlanfeldt (2001), which examines the effect of proximity to rail stations on residential property values in Atlanta and find that residential properties within a quarter mile of a station sell for 19 percent less than properties three miles from a station indicating that there are negative externalities associated with proximity to the station. Properties between one and three miles have a higher value than those further away indicating a positive benefit from being close but not too close to rail transit. This is the traditional inverted U-shaped proximity relationship observed in hedonic pricing models, which account for proximity effects.

The one study that we are aware of that examines buses and economic development focuses on property values. Rodriguez and Targa (2004) examine the effect of bus rapid transit (BRT) on property value in Bogota Columbia and find that property rental prices decrease by 6.8 percent to 9.3 percent for each five-minute increase in walking time to the BRT corridor, which suggests that BRT positively influences property values.

Cervero and Landis (1997), Bollinger and Ihlanfeldt (1997), Bowes and Ihlanfeldt (2001), and Green and James (1993) investigate the impact of rail stations on commercial development due to San Francisco's Bay Area Rapid Transit (BART) Atlanta's MARTA, and Washington, D.C.'s Metro, respectively. The BART and Metro studies compare commercial activity in

station and nonstation areas before and after station openings and do not control for other influences. The BART study finds a small effect of rail on commercial activities and the Metro study finds large effects. Bollinger and Ihlanfeldt include extensive controls and find that rail stations have no impact on commercial activity. Bowes and Ihlanfeldt (2001) focus exclusively on retail activity and find that rail stations further from the Central Business District have a positive effect on retail activity with the largest effects occurring within a quarter and half mile from the station.

A variety of studies have also looked at infrastructure, particularly roads and economic development. Wasylenko (1997) provides a key review of findings, as does Fox and Porca (2001), with the latter focusing on rural growth and the former reviewing the broad literature. A variety of empirical studies have addressed this issue. Bollinger and Ihlanfeldt (2003) examine a variety of tax incentive programs and investment in transportation infrastructure and find that highway improvements increase the employment share at the census tract level while investment in rail stations did not. Dalenburg, Partridge, and Rickman (1998) find that investment in public highways and other public capital has a positive impact on state employment growth. In sum, the literature to date provides evidence that transportation infrastructure positively effects economic activity.

## *Transit and Employment Outcomes*

A variety of studies examine the relationship between automobile access and employment outcomes. Car ownership positively influences employment (Baum 2009; Ong 2002; Raphael and Rice 2002) although the latter study also shows that car ownership has a negative effect on wages within the same sample. The negative effect on wages may be attributed to not controlling for urban versus rural labor markets. Gurley and Bruce (2005) examine vehicle access (a broader measure than ownership), control for urban and rural differences and find that car access positively affects employment, hours worked, and pay levels.

Studies examining employment outcomes and other types of transit have focused on job accessibility. These studies use different geographic areas, different statistical methods, and focus on different groups of employees and find differing effects. Sanchez, Shen, and Peng (2004) and Bania, Leete, and Coulton (2008) show that access to transit, including bus transit in the later study, has no affect on employment outcomes. In contrast, Sanchez (1999) finds that access to public transit leads to higher labor force participation in Portland, Oregon, and Atlanta, Georgia. Allard and

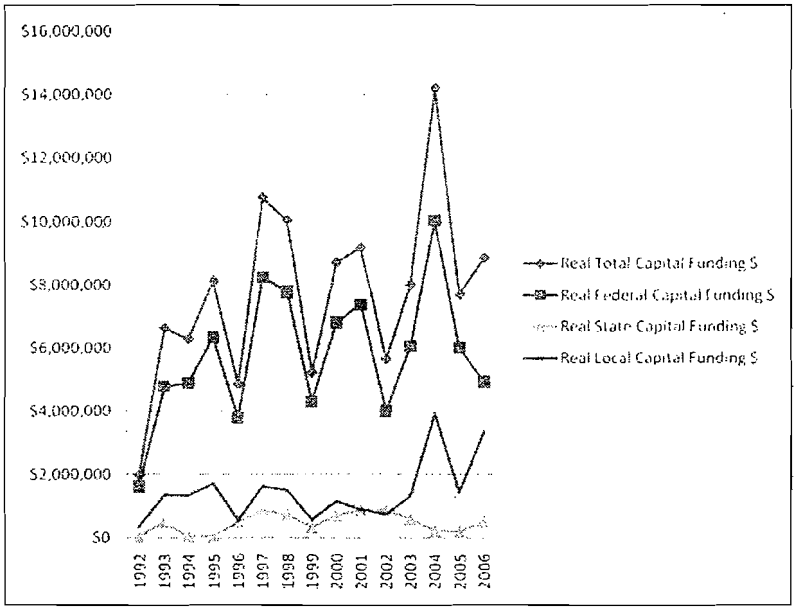


**Figure 1.** Transit system funding 1992–2006 ($). Note: All dollar values in 1982–1984 constant dollars.

Danziger (2003) and Ong and Blumenberg (1998) do not use specific transit measures but find that proximity to jobs positively affects employment outcomes.

In sum, studies examining transit and economic development along with studies examining transit and employment outcomes have focused on large cities and have found limited effects. There are likely to be differences in results for cities of different sizes. In their analysis of metropolitan areas of different sizes, Partridge and Rickman (2008) find that job growth has a larger effect on reducing poverty in smaller metropolitan areas than in larger metro areas. Jobs are likely to be more accessible in smaller cities and the economic development impact of bus transit is likely to be more diffuse than that of fixed-route rail.

## Brief Overview of Transit in Small Midwestern Cities

Figures 1–4 show various characteristics of the transit systems for the counties with bus systems in our sample. Figure 1 shows that the level of real

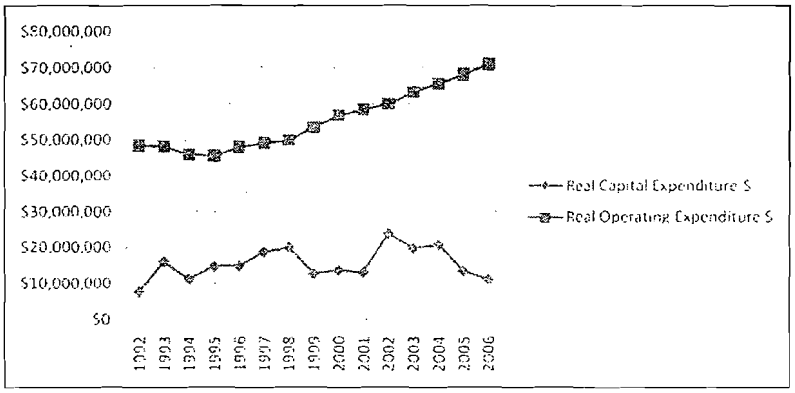


**Figure 2.** Transit system real capital and operating expenditures for bus system 1992–2006 ($). Note: All dollar values in 1982–1984 constant dollars.

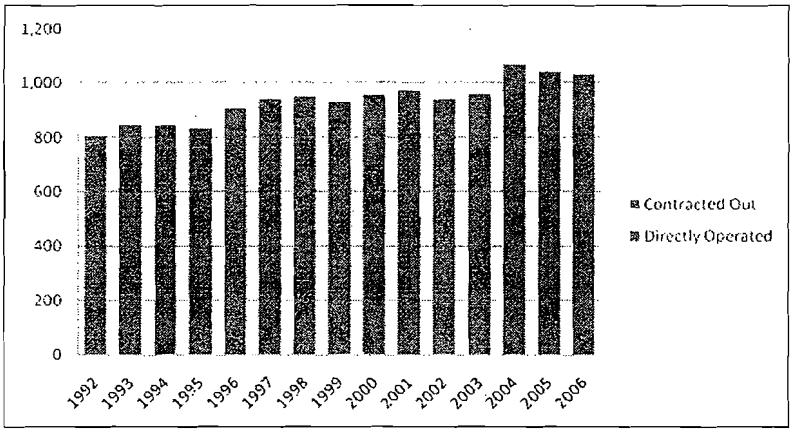


**Figure 3.** Number of buses 1992–2006.

total capital funding for all public transit in these counties (this includes bus, demand response, light rail, and ferry boat) was somewhat variable although the overall trend was an increase from $1.98 million in 1992 to over $8.85 million in 2006 with a peak of $14.2 million in 2002 (in 1982–1984 constant dollars). The federal government provided the largest share of capital funding. As shown in figure 2, real operating expenditures for bus systems increased from $48.46 million in 1992 to $71.1 million

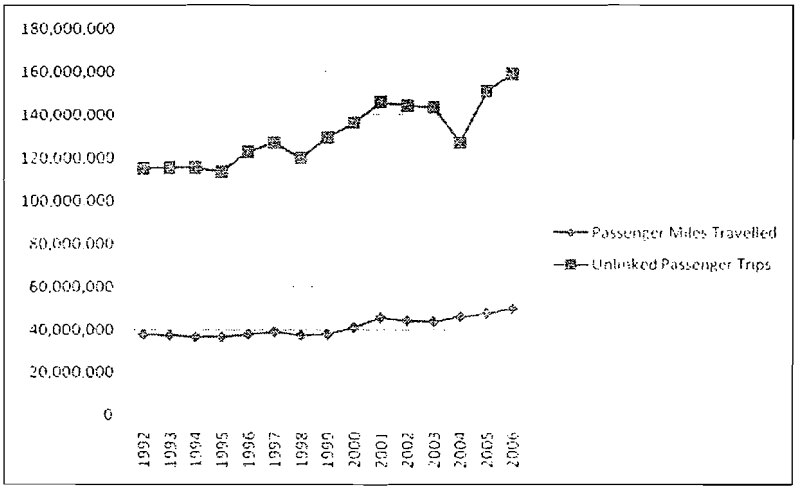


**Figure 4.** Transit usage 1992–2006.

(46.6 percent) in 2006. Capital expenditures on rolling stock (buses) and related facilities was more variable but increased from $7.67 million in 1992 to $11.1 million in 2006.

Figures 3 and 4 focus on capacity and usage of transit systems in the counties with bus systems included in the study. Since the mid-1990s, the number of buses both directly operated and contracted out for traditional fixed-route bus systems have increased steadily from 805 in 1992 to 1,030 in 2006 (28 percent). The general trend in bus usage has been positive, although there is a visible variability. Over this period, unlinked bus passenger trips increased from 37.6 million to 49.7 million (32 percent) and passenger miles traveled increased from 115 million to 159.1 million (38 percent).

## Modeling Strategy

Our approach is to use a pure treatment model to examine the effects of transit on economic development outcomes. In the model, we control for the presence of a transit system and county (cross section) fixed effects, which take into account differences among counties that do not vary over time. The model takes the following form:

$$Y_{it} = \alpha + \beta_{it}(Bus) + \varphi t + \theta\delta_{t-1} + \gamma_i + \varepsilon_{it}. \quad (1)$$

where $Y_{it}$ represents the various economic development measures considered in this analysis: growth in real per capita personal income, employment growth, population growth, the unemployment rate, the poverty rate, growth in real family assistance per capita, and growth in food stamps per capita. Our basic model specifies economic development as a function of an intercept, a binary variable for counties that have bus systems, a time trend, autoregressive terms, cross-section (county) fixed effects dummies, and a white noise error term. We also specify a second model in which we use operating expenses per capita for the county's bus system as a measure of the size of the bus system in place of the binary bus variable. Higher operating expenses indicate that a bus system covers more territory or has more frequent coverage of existing routes both of which increase the availability of transit to potential users. We expect that larger bus systems are more likely to positively influence employment and to reduce transfer payments.

There is the potential for endogeneity bias with the provision of public transit. Economic growth and transit investment may be simultaneously determined. More rapidly growing cities and those with greater fiscal resources may be more likely to pursue infrastructure investment, and transit is one form of infrastructure investment. The resources for public bus services are primarily derived from Federal grants with a local match to qualify for federal funding, and operating funds (staff salaries) must come from local sources. More rapidly growing and richer communities are more likely to posses planning and coordinating capacity to obtain and administer a public bus service than poorer communities or, in our sample, those in decline. The likelihood of applying for federal transit funding may be related to differences in human capital, local government efficiency, or political enthusiasm for these types of intergovernmental transfer. This problem is not limited to transportation infrastructure, and indeed may be more of a concern in studies examining firm entrance and expansion, for example. In addition, regional growth may influence the level of federal transit funding. If transit dollars are allocated more disproportionately based on growth, poverty, or demographic characteristics, then endogeneity in transit funding may bias the coefficients of the model.

Within the literature, there are two methods for dealing with the endogeneity concern. The more common and earlier method is a simultaneous equation approach using elements of a production function. This technique is attractive since it imposes some theoretical basis for the interpretation of the relationships and the resulting estimates. This method has three significant limitations beyond the appropriate structuring of the production

function relationship. First, these models are necessarily data intensive requiring information on local capital stock, human capital, and production output with some frequency of observation (annually in the current application). Second, the relationship between the basic production function and some identifying relationship must be structured. Finally, adding additional structure to the model imposes the potential for additional endogeneity problems beyond those existing with transportation infrastructure.

The first two of these limitations present a particular nuisance to the issue we address. Our research explores the impact of bus transit systems in small cities over a period of less than two decades. While we have data on annual capital expenditures on transit, data on the capital stock for a regional production function are nearly nonexistent. Furthermore, use of human capital estimates over the 1992–2006 period would necessitate the interpolation of no more than two census periods onto local population estimates. For these reasons, we have chosen to use a simpler empirical method and the standard treatment for addressing the potential for endogeneity bias.

A pure treatment model offers an alternative to a structured production function. This approach has been used in a number of settings to model potentially endogenous firm entrance into regions (see Basker 2005; Hicks 2008). This is a more appropriate choice for our research question. First, we believe that the question we seek to answer offers a fairly controlled examination of the data, which would serve to minimize endogeneity bias. We limit our sample to communities in the Great Lakes region. The choice of these locations was made specifically to establish a heterogeneous sample. Second, the questions we are asking appear to have less endogeneity concern than other related questions in the literature. For example, the articles noted above focus on either aggregate infrastructure expenditures in a region (clearly endogenous) or location decisions by retail firms (another obvious candidate for locating due to regional growth).

In contrast, our list of growth and social service measures do not, on their face, present a robust concern regarding endogeneity of a bus transit system. Indeed, none of these variables would appear to present the bias inducing risk of a measure of public capital stock, for example, because bus transit systems are a small component of overall public capital stock. Furthermore, we do not believe that there is a clear budgetary linkage between these programs and transportation at the Federal level. Since the largest component of funding for these bus systems is primarily federal, it is in our judgment a fairly benign endogeneity concern here. While there are formal mechanisms for testing for endogeneity, the introduction of a production function or simultaneous equation model in this setting offers some significant

drawbacks beyond the data limitations. Were we to have data on public and private capital stock, we would need a convincing identification strategy for the presence of a city bus system. We view this as a fairly elusive task. As a consequence, rather than attempt to preemptively correct for the presence of endogeneity, we draw samples from a relative homogeneous region, use multiple sampling methods that allow us to assess similarities and differences in results among these samples, and test for endogeneity using a standard technique.

## Data, Sampling Method, and Estimation

We investigate the relationship between public transit in small- to mid-sized communities and economic development including changes to patterns of transfer payments and employment. Panel data from 1992 to 2006 and a variety of traditional and nontraditional dependent variables are used to examine the impact of transit. Variables traditionally used to measure economic development include population, employment, and income growth. Nontraditional variables include unemployment rates, poverty rates, and federal transfer payments. These latter variables provide information on impact of transit investment on low-income populations.

We use three control groups to examine the economic effects of bus transit. The rationale behind using three control groups is to control for endogeneity, minimize concerns with omitted variables, and ensure that our results are robust. There is some overlap among the counties in each control group. The first control group is constructed using propensity score matching. The propensity score matching model uses 1970 county characteristics to estimate the influence of specific factors on the probability that a county will have bus transit during the study period (1992–2006). The propensity score estimates the likelihood that any county will have bus transit based on the characteristics of counties that actually have transit. Matching counties based on the likelihood that they have bus transit should control for the factors that predisposed particular counties to have bus transit controlling for endogeneity. Using this method, each county with transit is matched to the county with the nearest propensity score that does not have transit.

The second control group is constructed using a nonequivalent group design (NEG) of the type presented by Reed and Rogers (2003) and Hicks (2003). In these articles, univariate comparisons between the treatment and control groups are performed. We extended this approach by including a multivariate scoring process on both concurrent and pretest periods. Our intent was to minimize the internal threat to validity of the selection by

including a time period prior to federal subsidization of municipal bus service. In this approach, we selected a control sample by scoring all nontreatment counties on most proximal personal income, per capita income, total employment, and growth in each of these variables (from 1970 to 2008). Each county was scored on each attribute and a control sample selected from the highest scoring $n$ counties. These counties qualified for inclusion into the NEG as they demonstrated the most similar set of economic characteristics from a period extending more than a decade prior to through the end of the study period. This provides a direct control for endogeneity by matching individual locations with those that are most similar but without a transit system.

The third control group was constructed using two criteria: (1) counties with population between 50,000 and 125,000 inhabitants in 1950 in the six aforementioned states and (2) counties with cities with boundaries primarily in one county. This selection criterion was based on a larger regional analysis initiative of small urban areas within the Great Lakes region. We call this the Like City method. As with the NEG process, the Like City process allows us to create a control sample based on size and geographic considerations. In these methods, we seek to limit the potential bias inducing influence of endogeneity by crafting a control sample to compare with the treatment sample of cities with transit systems.

Table 1 shows the definitions and sources of the variables that we use in the model. Descriptive statistics for the total sample, counties with bus systems, the six counties that started bus systems between 1992 and 2006, and counties without bus systems for each sampling method are shown in table 2. The counties with bus systems are the same for each sampling method.[5] The control groups (counties without bus systems) are different with some overlap of counties.

Of the counties included in the sample, 46 percent had bus systems during this period. The values of many of the variables that we consider were more favorable in the counties with bus systems. Average real income growth, per capita income growth, population growth, and employment growth were larger in these counties, but the variation was also greater compared to counties without bus systems. For the six counties that started bus systems, the average values of these variables were even higher compared to all counties with bus systems. The unemployment rate was lower in counties with bus systems. The descriptive statistics show that average family assistance payments per capita declined over this period. The decline was greater in counties with bus systems relative to counties without bus systems. The decline in average real family assistance was larger in counties

**Table 1.** Variable Description and Sources

| Variable | Definition | Source |
|---|---|---|
| Bus dummy | =1 if there is a bus system in the county<br>=0 otherwise | National Transit Database |
| Started bus system dummy | =1 if a bus system was started in the county between 1992 and 2006<br>=0 otherwise | National Transit Database |
| Real operating expenditures per capita ($) | Annual operating expenses divided by the county population | National Transit Database and Regional Economic Information System (REIS) |
| Real growth in family assistance per capita ($) | Annual growth in per capita state-administered benefit payments to low-income families (Aid to Families with Dependent Children, AFDC or Temporary Aid to Needy Families, TANF) | REIS |
| Real growth in food stamps per capita($) | Annual growth in per capita food stamps issued to low-income individuals | Transit Dummy |
| Real per capital income growth ($) | Annual change in per capita income | REIS |
| Population growth | Annual change in population | REIS |
| Employment growth | Annual change in employment | Bureau of Labor Statistics |
| Unemployment rate | The percentage of the labor force that is not employed | Bureau of Labor Statistics |
| Poverty rate | The percentage of people with incomes below the poverty threshold | Small Area Income and Poverty Statistics, U.S. Census Bureau |

with transit. In contrast, per capita food stamp payments increased in counties with bus systems and decreased in counties without bus systems.[6]

Finally, only six counties opened bus systems over the 1992–2006 period. Since we also control for county (cross section) fixed effects, these six counties identify the model. These counties permit the direct measurement of the incremental contributions of bus systems on our labor force and public service expenditures over the study period. We carefully compared the public data for each transit system and confirmed the absence of a nonfederally funded transit system in the control sample. In no instance did we find counties with bus systems that ceased operation during the study

**Table 2.** Descriptive Statistics

| | Propensity Scoring Counties without Bus Systems (Thirty-Nine Counties) | | | NEG Method Counties without Bus Systems (Thirty-Nine Counties) | | | Like City (1950 Population) Counties without Bus Systems (Forty Counties) | | | Counties with Bus Systems a (Thirty-Nine Counties) | | | Counties Starting Bus Systems (Six Counties) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Obs. | Mean | Std. Dev. | Obs. | Mean | Std. Dev. | Obs. | Mean | Std. Dev. | Obs. | Mean | Std. Dev. | Obs. |
| Bus dummy | 0 | 0 | 585 | 0 | 0 | 585 | 0 | 0 | 600 | 0.92 | 0.27 | 585 | 0.47 | 0.50 | 90 |
| Started bus system dummy | 0 | 0 | 585 | 0 | 0 | 585 | 0 | 0 | 600 | 0.15 | 0.36 | 585 | 1.00 | 0.00 | 90 |
| Real operating expenses per capita for bus system ($) | 0 | 0 | 585 | 0 | 0 | 585 | 0 | 0 | 600 | 9.47 | 7.93 | 585 | 1.30 | 2.18 | 90 |
| Growth in real family assistance per capita ($) | −1.76 | 5.22 | 541 | −1.38 | 4.49 | 537 | −1.77 | 5.71 | 560 | −2.24 | 6.89 | 546 | −1.84 | 5.44 | 84 |
| Growth in real food stamp payments per capita ($) | −0.09 | 5.45 | 546 | −0.05 | 4.75 | 546 | −0.35 | 6.18 | 560 | 0.06 | 4.78 | 546 | 0.06 | 4.95 | 84 |
| Growth in real personal income ($000) | 6,338 | 20,943 | 546 | 8,816 | 27,256 | 546 | 18,394 | 36,258 | 560 | 36,040 | 64,535 | 546 | 39,880 | 45,607 | 84 |
| Growth in real per capita income ($) | 116 | 335 | 546 | 107 | 367 | 547 | 129 | 283 | 560 | 159 | 307 | 546 | 157 | 285 | 84 |
| Population growth | 29 | 349 | 546 | 185 | 783 | 546 | 351 | 985 | 560 | 752 | 1,223 | 546 | 1,272 | 1,104 | 84 |
| Employment growth | 183 | 633 | 546 | 285 | 981 | 546 | 426 | 1,293 | 560 | 560 | 1,690 | 546 | 778 | 1,638 | 84 |
| Unemployment rate (%) | 5.83 | 1.89 | 585 | 5.47 | 1.60 | 585 | 5.89 | 1.79 | 600 | 5.02 | 1.72 | 585 | 4.95 | 1.66 | 90 |
| Poverty rate (%) | 10.44 | 2.42 | 429 | 10.44 | 2.42 | 429 | 10.91 | 3.32 | 440 | 10.56 | 3.08 | 429 | 9.01 | 1.89 | 66 |

Note: NEG = nonequivalent group design.
[a]Includes counties starting bus systems.

period. We estimate six separate models using three sampling techniques—three models including all counties with and without bus systems and three models including only the six counties that opened bus systems during the study period and counties without bus systems.

The models were estimated using generalized least squares. We corrected for heteroscedasticity using White's (1980) method. We included autoregressive terms to account for autocorrelation observed in the basic model. We conducted Hausman tests to test for exogeneity in each regression where transit is statistically significant. In each case, we failed to reject the presence of exogeneity between transit and the dependent variable that provides weak evidence that endogeneity is not a problem.

## Results

Tables 3 and 4 display the results of the regression analysis. Table 3 includes all counties with bus systems and each control group. Table 4 includes counties that started bus systems and each control group.

### *Results for all Counties*

The results for the samples that include all counties with transit and the control groups of counties without transit are generally weak (table 3). The regression coefficients have the expected sign but few of the coefficients are statistically significant. The variables that are significant are only significant for one of the transit measures, the transit dummy or real operating expenses per capita. Real growth in family assistance per capita is significant and negatively related to the size of the transit system (measured as real operating expenses per capita) for each of the three samples. Real growth in food stamp payments is significant and negatively related to the presence of transit (measured as the transit dummy variable) in each of the three samples. Family assistance is primarily Temporary Aid to Needy Families (TANF) in the mid to late 1990s and Aid to Families with Dependent Children (AFDC) before and the primary constituents are single mothers. Whereas food stamps target a more general population including the AFDC/TANF population but also other households needing food assistance. The regression results suggest that transit may have differential effects on these populations—that transit may have less impact on low-income, single mothers relative to other families experiencing hardship. For the more general economic variables, employment growth is significant (or close to significant with $p$ values just over .10) and positive for

**Table 3.** All Counties [*p* Value]

| | Propensity Scoring Method | | NEG Method | | Like City | |
|---|---|---|---|---|---|---|
| Variables | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita |
| *Real growth in family assistance per capita* | −0.422 [0.748] | −0.187* [0.058] | −0.203 [0.872] | −0.154 [0.096] | −0.035 [0.973] | −0.245*** [0.009] |
| Adjusted $R^2$; *F* stat | 0.15; 2.97 | 0.15; 3.02 | 0.17; 3.39 | 0.17; 3.43 | 0.15; 3.1 | 0.16; 3.18 |
| D-W stat; Obs. | 2.02; 929 | 2.02; 929 | 1.99; 927 | 1.99; 927 | 2.03; 948 | 2.03; 948 |
| *Real growth in food stamp payments per capita* | −1.994***[0.003] | −0.083 [0.155] | −1.76*** [0.008] | −0.044 [0.423] | −1.515* [0.067] | −0.106** [0.027] |
| Adjusted $R^2$; *F* stat | 0.65; 23.09 | 0.65; 22.92 | 0.67; 24.7 | 0.67; 24.48 | 0.60; 20.1 | 0.60; 20.1 |
| D-W stat; Obs. | 1.98; 936 | 1.98; 936 | 1.95; 936 | 1.95; 936 | 2.03; 1,027 | 2.03; 1,027 |
| *Real growth in personal income (000)* | −9,069[0.196] | −1,195* [0.064] | −7,447 [0.302] | −894 [0.176] | −9.126 [0.145] | −0.227 [0.736] |
| Adjusted $R^2$; *F* stat | 0.29; 5.76 | 0.29; 5.77 | 0.28; 5.57 | 0.28; 5.56 | 0.26; 5.18 | 0.26; 5.14 |
| D-W stat; Obs. | 2.04; 936 | 2.04; 936 | 2.03; 936 | 2.03; 936 | 20.3; 948 | 2.03; 948 |
| *Real growth in per capita income* | −57.13 [0.342] | −3,518.4 [0.499] | −48,638 [0.431] | −2,041.8 [0.700] | −99.798 [0.102] | −1.081 [0.810] |
| Adjusted $R^2$; *F* stat | 0.07; 1.84 | 0.067; 1.83 | 0.07; 1.86 | 0.07; 1.85 | 0.048; 1.59 | 0.069; 1.95 |
| D-W stat; Obs. | 2.05; 936 | 2.05; 936 | 20.3; 936 | 2.03; 936 | 20.2; 948 | 2.04; 1,027 |
| *Population growth* | 150.28 [0.136] | 10.49 [0.307] | 138.7 [0.176] | 12.36 [0.266] | 177.103** [0.0496] | 14.926 [0.177] |
| Adjusted $R^2$; *F* stat | 0.84; 65.5 | 0.83; 62.6 | 0.85; 66.2 | 0.84; 59.96 | 0.867; 76.59 | 0.855; 75.84 |
| D-W stat; Obs. | 2.04; 1,014 | 2.03; 1,014 | 1.94; 936 | 1.93; 936 | 1.95; 948 | 1.99; 1,027 |

*(continued)*

**Table 3 (continued)**

| | Propensity Scoring Method | | NEG Method | | Like City | |
|---|---|---|---|---|---|---|
| Variables | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita |
| *Employment growth* | 356.52 [0.122] | 42.162 [0.104] | 378.24 [0.104] | 44.509* [0.088] | 307.041 [0.101] | 43.355* [0.075] |
| Adjusted $R^2$; *F* stat | 0.179; 3.52 | 1.179; 3.52 | 0.20; 3.89 | 0.205; 3.98 | 0.12; 2.62 | 0.15; 3.33 |
| D-W stat; Obs. | 2.14; 936 | 2.14; 936 | 2.12; 936 | 2.11; 936 | 2.10; 948 | 2.04; 1,027 |
| *Unemployment rate* | −0.31*** [0.005] | −0.01 [0.330] | −0.304*** [0.005] | −0.010 [0.342] | −0.246** [0.018] | −0.007 [0.529] |
| Adjusted $R^2$; *F* stat | 0.872; 86.56 | 0.87; 86.19 | 0.867; 82.8 | 0.867; 82.6 | 0.89; 104.87 | 0.892; 104.33 |
| D-W stat; Obs. | 2.05; 1,014 | 2.05; 1,014 | 2.04; 1,014 | 2.05; 1,014 | 2.03; 1,027 | 2.03; 1,027 |
| *Poverty Rate* | −0.17 [0.617] | −0.0079 [0.825] | −0.170 [0.617] | −0.0079 [0.825] | 0.087 [0.682] | 0.133*** [0.000] |
| Yr. = 1993, 1995, 1997–2005 | | | | | | |
| Adjusted $R^2$; *F* stat | 0.94; 112.5 | 0.94; 112.6 | 0.943; 112.5 | 0.943; 112.6 | 0.949; 182.2 | 0.947; 172.95 |
| D-W stat; Obs. | 1.84; 546 | 1.84; 546 | 1.84; 546 | 1.84; 546 | 1.09; 790 | 1.10; 790 |

Note: NEG = nonequivalent group design.
Significance: * .1 level, ** .05 level; *** .01 level.

**Table 4.** Six Counties Adding Bus Systems and Counties without Bus Systems [*p* Value]

| | Propensity Scoring Method | | NEG Method | | Like City | |
|---|---|---|---|---|---|---|
| Variables | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita |
| *Real growth in family assistance per capita* | −0.22 [0.866] | −0.461*** [0.0097] | −0.054 [0.974] | −0.611*** [0.000] | −0.526 [0.658] | −0.529 [0.004] |
| Adjusted $R^2$; *F* stat | 0.15; 3.02 | 0.23; 3.09 | 0.09; 2.16 | 0.64; 21.36 | 0.18; 3.48 | 0.185; 3.54 |
| D-W stat; Obs. | 2.00; 533 | 2.01; 533 | 1.98; 531 | 1.93; 540 | 2.03; 548 | 2.04; 548 |
| *Real growth in food stamp payments per capita* | −2.189*** [0.003] | −0.66*** [0.000] | −1.809*** [0.010] | −0.611*** [0.000] | −2.490*** [0.003] | −0.699*** [0.000] |
| Adjusted $R^2$; *F* stat | 0.61; 18.58 | 0.62; 19.32 | 0.635; 20.5 | 0.644; 21.36 | 0.541; 14.18 | 0.552; 14.7 |
| D-W stat; Obs. | 1.98; 540 | 1.99; 540 | 1.92;540 | 1.93; 540 | 1.98; 548 | 1.99; 548 |
| *Real growth in personal income (000)* | −12,035* [0.054] | 382 [0.753] | −10,265 [0.129] | 916 [0.427] | −5.76 [0.426] | 1.651 [0.117] |
| Adjusted $R^2$; *F* stat | 0.19; 3.76 | 0.193; 3.68 | 0.20; 3.86 | 0.20; 3.83 | 0.23; 4.33 | 0.23; 4.36 |
| D-W stat; Obs. | 2.05; 540 | 2.05; 540 | 2.03; 540 | 2.03; 540 | 2.03; 548 | 20.2; 548 |
| *Real growth in per capita income* | −75.87 [0.181] | −0.029 [0.831] | −60,211.2 [0.309] | 3,606.0 [0.772] | −75.128 [0.271] | 3.064 [0.799] |
| Adjusted $R^2$; *F* stat | 0.07; 1.90 | 0.15; 3.04 | 0.06; 1.76 | 0.06; 1.74 | 0.114; 1.31 | 0.02; 1.29 |
| D-W stat; Obs. | 2.07; 540 | 2.08; 540 | 2.03; 540 | 2.03; 540 | 2.01; 548 | 2.00; 548 |
| *Population growth* | 183.55* [0.077] | 42.88 [0.057] | 139.92 [0.162] | 38.35* [0.077] | 219.345** [0.028] | 50.05** [0.014] |
| Adjusted $R^2$; *F* stat | 0.73; 32.02 | 0.73; 32.23 | 0.76; 36.1 | 0.76; 36.37 | 0.83; 55.25 | 0.83; 55.57 |
| D-W stat; Obs. | 1.90; 540 | 1.90; 540 | 1.97; 540 | 1.98; 540 | 1.99; 548 | 1.99; 548 |

*(continued)*

**Table 4 (continued)**

| | Propensity Scoring Method | | NEG Method | | Like City | |
|---|---|---|---|---|---|---|
| Variables | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita | Transit Dummy | Real Operating Expenses per Capita |
| *Employment growth* | 390.85* [0.099] | 136.83*** [0.000] | 438.77* [0.071] | 140.26*** [0.000] | 369.13 [0.114] | 138.378*** [0.000] |
| Adjusted $R^2$; *F* stat | 0.219; 4.15 | 0.226; 4.27 | 0.27; 5.15 | 0.276; 5.28 | 0.127; 2.63 | 0.135; 2.75 |
| D-W stat; Obs. | 2.16; 540 | 2.17; 540 | 2.13; 540 | 2.13; 540 | 2.09; 548 | 2.1; 548 |
| *Unemployment rate* | −0.276** [0.017] | −0.076*** [0.000] | −0.265** [0.019] | −0.072*** [0.000] | −0.215** [0.050] | −0.059*** [0.001] |
| Adjusted $R^2$; *F* stat | 0.847; 68.24 | 0.85; 69.05 | 0.838; 63.8 | 0.84; 64.6 | 0.887; 95.85 | 0.89; 95.95 |
| D-W stat; Obs. | 2.03; 585 | 2.03; 585 | 2.02; 585 | 2.02; 585 | 2.02; 594 | 2.01; 594 |
| *Poverty rate* | −0.276 [0.508] | 0.028 [0.573] | −0.276 [0.508] | 0.028 [0.573] | 0.229 [0.349] | 0.186*** [0.000] |
| Yr. = 1993, 1995, 1997–2005 | | | | | | |
| Adjusted $R^2$; *F* stat | 0.95; 130.5 | 0.952; 131.3 | 0.95; 130.5 | 0.952; 131.3 | 0.94; 163.86 | 0.948; 171.2 |
| D-W stat; Obs. | 1.92; 315 | 1.90; 315 | 1.92; 315 | 1.90; 315 | 1.12; 457 | 1.14; 457 |

Note: NEG = nonequivalent group design.
Significance: * .1 level, ** .05 level; *** .01 level.

five of the six specifications. The unemployment rate is significant and negatively related to the transit dummy. These results together suggest that bus systems can have a small but positive impact on employment outcomes.

### Results for Counties Starting Bus Systems

The results for the regressions including the six counties starting bus systems over this period are generally more consistent across sampling methods and the transit variable. Real growth in food stamp payments per capita is significant and negatively related to both transit variables for each sample. Real growth in family assistance per capita is significant and negatively related to the transit measure of real operating expenses. In addition, population growth and employment growth are significant and positively related to the transit measures, while the unemployment rate is significant and negatively related. These results suggest that bus transit has larger initial effects on employment and social services when a transit system is introduced.[7] The smaller impacts in the samples that include all counties with transit suggest that these initial effects may dissipate over time.

### Implications

The regression results suggest that the size of the bus system (measured by operating expenditures per capita) in a county affects the low-income population. Annual real growth in family assistance per capita and annual real growth in food stamp payments is lower in counties with transit systems over the study period. The population captured by these socioeconomic variables is low-income households. Previous research suggests that a large percentage of this demographic does not have access to a reliable automobile for personal transportation and that alternatives are necessary to meet their transportation needs. While previous studies focusing on larger cities (Sanchez, Shen, and Peng 2004; Bania, Leete, and Coulton 2008) showed that access to public transportation had no impact on labor market outcomes for low-income population in large cities (Atlanta, Baltimore, Dallas, Denver, Milwaukee, Portland, and Cleveland), the findings discussed above indicate that public transportation may have a positive impact on job access in small cities.

The presence of bus transit and the size of the bus system also affect the unemployed population. The unemployment rate is significantly lower in counties with transit systems, which indicates that counties with transit may experience lower levels of unemployment and/or shorter unemployment spells. These findings suggest that transit systems increase the access of

low-income individuals to jobs. However, despite increased access to jobs, earnings are not high enough to positively affect overall income growth or the poverty rate although the negative effect on the growth in food stamp payments per capita suggests that low-income households may experience positive effects on income for this group. There are a variety of effects at work. Transit increases access to jobs, which increases labor supply. The low skill, low wage segment of the labor market is particularly affected. More workers willing and able to supply labor in this submarket put downward pressure on wages, which dampens earnings growth.

Another mechanism that explains the negative relationship between increased access to jobs and income growth is related to the distance between residential and work locations. Increased distance between the residential and work location may lead to longer travel times and more complex and unreliable transit trips or lower access to information about job opportunities (Bania, Leete, and Coulton 2008, 2181). Problems with the reliability of transit and/or higher commuting costs may affect the employment level, duration of employment spells, absenteeism, or tardiness for workers commuting via transit. These issues will in turn affect earnings and/or hours worked due to lower job performance because of poor job matches or slower accumulation of experience, which may ultimately lead to stagnation in aggregate earnings growth as measured by per capita income growth and the poverty rate.

The findings that the presence of bus transit in small cities has a positive impact on labor market variables (in contrast to the limited economic development impact of rail transit in larger cities) may result from the flexibility of bus transit relative to rail. Unlike fixed-route rail, bus transit routes can be adjusted to serve new or growing retail centers or industrial parks, for example. In addition, the negative labor market impacts associated with spatial mismatch are likely to be less pronounced in smaller cities relative to larger cities. Differences in the results for all counties with transit relative to counties starting bus systems during the study period may reflect greater variability in systems' ability to transport people from residences to jobs due to planning, marketing, or accessibility.

## Summary and Extensions

Previous analysis suggests a limited but positive relationship between public transportation, primarily rail systems, and economic growth. The focus of the current analysis is to examine the impact of bus transit on traditional and

nontraditional measures of economic development using samples of counties with small- to mid-sized cities in the upper Midwest. Relative to counties without bus systems, counties with bus systems have significantly lower unemployment rates, lower growth in family assistance and food stamp payments, and higher population and employment growth. In addition, the size of the bus system (as measured by operating costs per capita) matters. As the size (reach) of the bus system increases, family assistance and food stamp payments decrease. Yet, transit has no statistical effect on income growth. The positive impact on job access which reduces payments for family assistance and food stamps does not translate into income growth. These results are likely driven by supply-side effects in the labor market.

Nevertheless, this analysis suggests that there are previously unquantified impacts associated with investment in bus transit in small cities. Transit has a positive effect on getting people to work suggesting the transit has positive effects on the distribution of employment. However, this increased capacity to work does not result in statistically discernable income growth and potentially has a negative effect on the distribution of income (as measured by the poverty rate). This research offers only tentative direction to understanding this effect. One issue that deserves further analysis is the proposition that the growth in low wage workers (as a consequence of the increased transit availability) has dampened overall income growth in regions.

Future research should examine this issue more closely to better understand the impact of bus transit access on individual workers. Previous studies examining the relationship between job access and transit have used micro data on individual workers or potential workers in a variety of large cities. This work should be extended to employment outcomes and transportation usage for workers in smaller cities that have and do not have transit systems.

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## Appendix

**Table A1.** Transit Systems Included in the Analysis

| Transit System Name | City | County | State | City Population | County Population |
|---|---|---|---|---|---|
| Champaign—Urbana Mass Transit District | Urbana | Champaign | IL | 36,395 | 179,669 |
| City of Kankakee Taxi Van Program | Kankakee | Kankakee | IL | 27,491 | 103,833 |
| River Valley Metro Mass Transit District | Kankakee | Kankakee | IL | 27,491 | 103,833 |
| Decatur Public Transit System | Decatur | Macon | IL | 64,808 | 150,433 |
| Bloomington—Normal Public Transit System | Bloomington | McLean | IL | 81,860 | 114,706 |
| Greater Peoria Mass Transit District | Peoria | Peoria | IL | 112,936 | 183,433 |
| City of Danville/Danville Mass Transit | Danville | Vermilion | IL | 33,904 | 83,919 |
| Muncie Indiana Transit System | Muncie | Delaware | IN | 67,430 | 118,769 |
| Goshen Transit System | South Bend | Elkhart | IN | 51,874 | 182,791 |
| Heart City Rider Program | South Bend | Elkhart | IN | 51,874 | 182,791 |
| Michiana Area Council of Governments | South Bend | Elkhart | IN | 51,874 | 182,791 |
| City of Anderson Transportation System | Anderson | Madison | IN | 59,734 | 133,358 |
| Bloomington Public Transportation Corporation | Bloomington | Monroe | IN | 69,291 | 120,563 |
| Greater Lafayette Public Transportation Corporation | Lafayette | Tippecanoe | IN | 56,397 | 148,955 |
| Terre Haute Transit Utility | Terre Haute | Vigo | IN | 59,614 | 105,848 |
| Bay Metropolitan Transit Authority | Bay City | Bay | MI | 36,817 | 110,157 |
| Twin Cities Area Transportation Authority | Benton Harbor | Berrien | MI | 11,182 | 162,453 |
| Niles Dial-A-Ride | Niles | Berrien | MI | 12,204 | 162,454 |
| Battle Creek Transit | Battle Creek | Calhoun | MI | 53,364 | 137,985 |
| City of Jackson Transportation Authority | Jackson | Jackson | MI | 36,316 | 158,422 |
| Muskegon Area Transit System | Muskegon Heights | Muskegon | MI | 40,105 | 170,200 |
| Blue Water Area Transportation Commission | Port Huron | St. Clair | MI | 32,338 | 164,235 |
| Allen County Regional Transit Authority | Lima | Allen | OH | 40,081 | 108,473 |
| Springfield City Area Transit | Springfield | Clark | OH | 65,358 | 144,742 |
| Steel Valley Regional Transit Authority | Steubenville | Jefferson | OH | 19,015 | 73,894 |

*(continued)*

**Table A1 (continued)**

| Transit System Name | City | County | State | City Population | County Population |
|---|---|---|---|---|---|
| City of Newark Transit Operations | Newark | Licking | OH | 46,279 | 145,491 |
| Licking County Transit Board | Newark | Licking | OH | 46,279 | 145,491 |
| Portage Area Regional Transportation Authority | Kent | Portage | OH | 27,906 | 152,061 |
| Campus Bus Service | Kent | Portage | OH | 27,906 | 152,061 |
| Richland County Transit | Mansfield | Richland | OH | 49,346 | 128,852 |
| Centre Area Transportation Authority | State College | Centre | PA | 38,420 | 135,758 |
| County of Lebanon Transit Authority | Lebanon | Lebanon | PA | 24,461 | 120,327 |
| Williamsport Bureau of Transportation | Williamsport | Lycoming | PA | 30,706 | 120,044 |
| Green Bay Metro | Green Bay | Brown | WI | 102,313 | 226,778 |
| Eau Claire Transit | Eau Claire | Eau Claire | WI | 61,704 | 93,142 |
| Fond du Lac Area Transit | Fond du Lac | Fond du Lac | WI | 42,203 | 97,296 |
| Kenosha Transit | Kenosha | Kenosha | WI | 90,352 | 149,577 |
| LaCrosse Municipal Transit Utility | LaCrosse | La Crosse | WI | 51,818 | 107,120 |
| Wausau Area Transit System | Wausau | Marathon | WI | 38,426 | 125,834 |
| City of Appleton - Valley Transit | Appleton | Outagamie | WI | 70,087 | 160,971 |
| Belle Urban System - Racine | Racine | Racine | WI | 81,855 | 188,831 |
| City of Beloit Transit System | Beloit | Rock | WI | 35,775 | 152,307 |
| Janesville Transit System | Janesville | Rock | WI | 59,498 | 152,308 |
| Sheboygan Transit System | Sheboygan | Sheboygan | WI | 50,792 | 112,646 |
| Waukesha County Transit System | Waukesha | Waukesha | WI | 64,825 | 360,767 |
| City of Waukesha Transit Commission | Waukesha | Waukesha | WI | 64,825 | 360,767 |
| Oshkosh Transit System | Oshkosh | Winnebago | WI | 62,916 | 156,763 |

## Notes

1. Another reason for limiting the geographic area of the sample is potential errors in the control group, which necessitates identifying and directly contacting appropriate agencies in cities to determine the presence of transit systems that were not reported in the National Transit Database.
2. Mass transportation systems in the early part of the twentieth century were owned and operated by the private sector. With the advent of the automobile, many of these firms went out of business. See Kyvig and Marty (2003).
3. American Public Transportation Association (2008). Tables 40 and 47.
4. Ibid.
5. Some cities opened fixed-route bus systems during the 1992–2006 period. In 1992, thirty-three counties had bus systems. In 2006, thirty-nine counties had bus systems. Some counties have more than one bus system (there were a total of forty-seven bus systems in the counties with transit.
6. *T* tests for the difference between means shows significant differences between counties with bus systems and each control group for real growth in family assistance and unemployment rates and significant differences between counties starting bus systems and each control group for the unemployment rate and poverty rate.
7. We thank one of the anonymous referees for bringing this point to our attention.

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## Bios

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# Public Transit's Environmental and Energy Advantages

Hoosier Environmental

All Together Now

**Public transportation provides many benefits:**

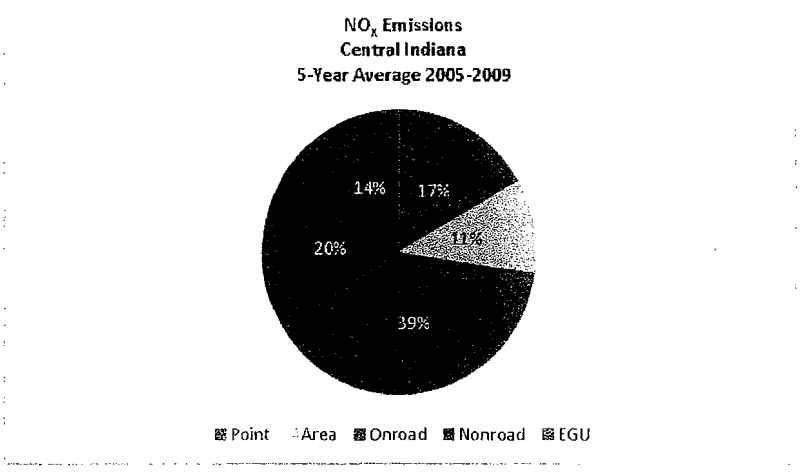
- Mobility & choice
- Job creation/job access
- Energy savings
- Reduced air pollution and carbon emissions

**More on public transit's environmental benefits**

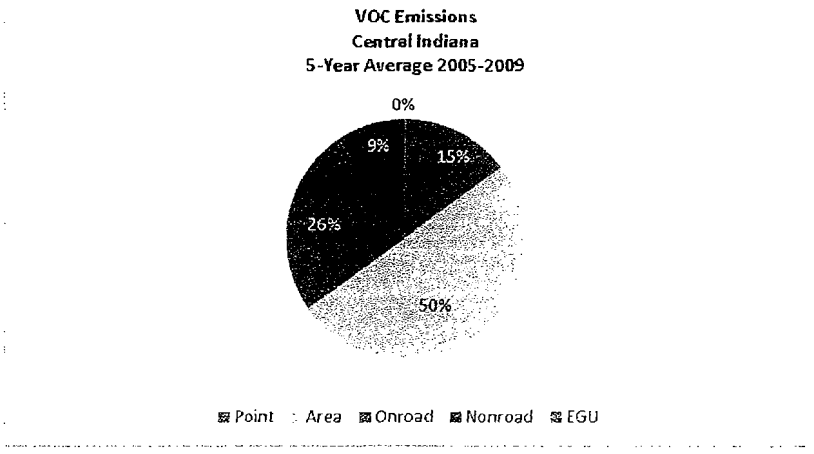
Improved and expanded public transit in Indiana will help reduce motor vehicle related air pollution as more people choose to use transit instead of driving.

Emissions from motor vehicles are a major contributor to Central Indiana ozone pollution. Nitrogen oxides and volatile organic compounds (VOCs) are the precursors to ozone. Vehicles are also the principal source of carbon monoxide emissions.

Central Indiana $NO_x$ Emissions




Central Indiana VOC Emissions

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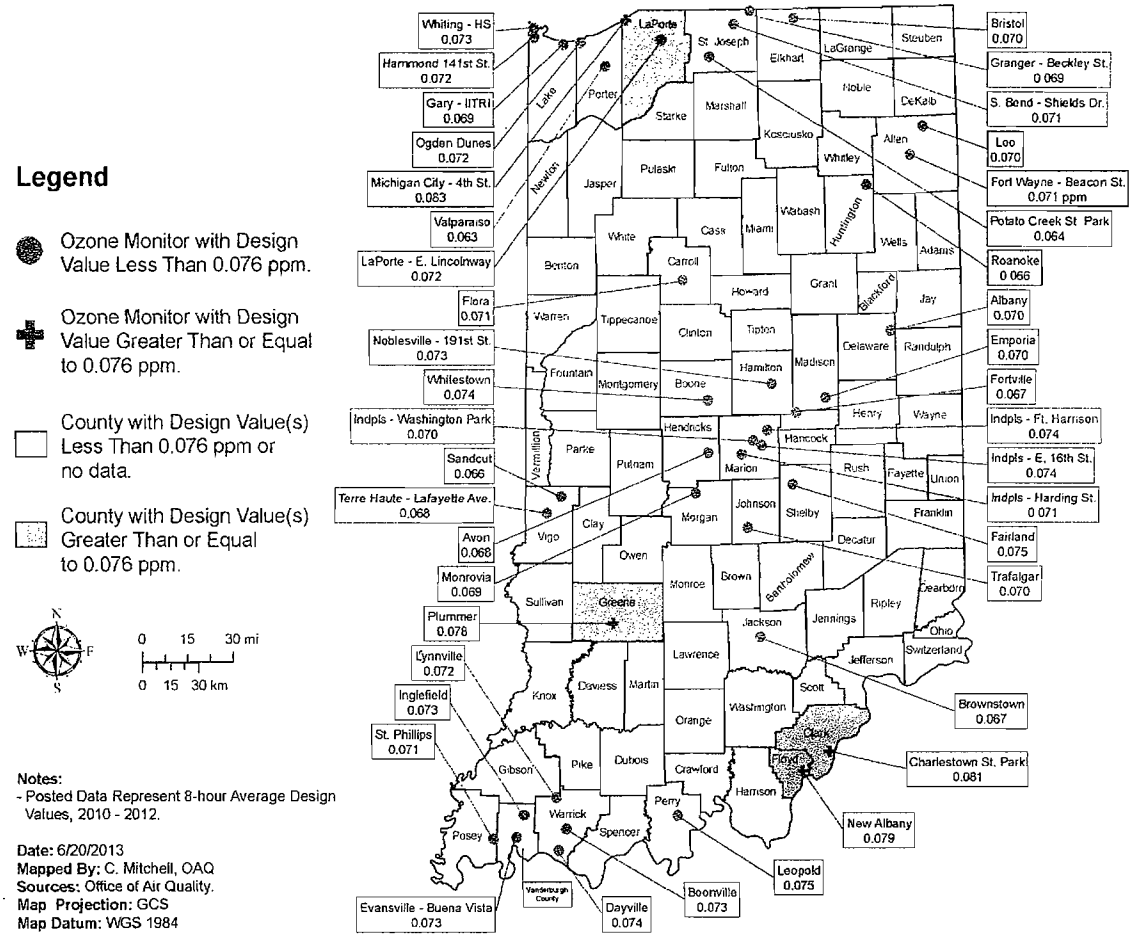



Source for charts and map: Indiana Department of Environmental Management

While only a few communities in Indiana exceed the national health-based air quality standard for ozone, many more communities have ozone levels just below the standard, making them vulnerable to falling out of attainment.

### More efficient use of land

Public transit infrastructure results in fewer impacts to wildlife habitat and water resources, compared to expanding highways and airports. Transit encourages more compact development, including walkable neighborhoods, which require less land and roadway space for parking spaces and parking lots.

### Public transit consumes less energy than personal vehicles.

Transportation consumes 71% of oil used in the U.S. Land impacts from oil extraction, and oil spills are consequences of America's oil dependence.

The number of spills each year has declined, but large spills with severe impacts still occur. In 2010 and 2013, there were two large spills in the central U.S.

- Kalamazoo River, MI 1.3 million gallons
- Mayflower, Arkansas 210,000 gallons

Source: U.S. EPA; U.S. DOT Bureau of Transportation Statistics; U.S. EIA

**Costs of Congestion**

In Indianapolis, 16.7 million gallons of gasoline were wasted due to congestion in 2011. Lost time and wasted gasoline affects commuters:

| Metro Area | Peak commuter average cost |
|---|---|
| Indianapolis | $930 |
| Louisville metro | $776 |
| Chicago metro-NWI | $1,153 |

Source: Texas Transportation Institute 2012

**Energy Intensity of Passenger Modes**

British thermal units (BTUs) per passenger mile are a widely used measure of energy intensity.

| Mode | BTUs/passenger mile<br>U.S. average |
|---|---|
| Personal vehicles: autos and light trucks | 4,617 |
| Bus transit | 3,343 |
| Rail transit (LT rail) | 2,462 |

Source: U.S. DOT-Bureau of Transportation Statistics

**Can transit use displace automobile use?**

| Metro area | Transit share | Personal vehicle share | City | Transit share | Personal vehicle share |
|---|---|---|---|---|---|
| Pittsburgh metro | 5.5% | 86.2 % | Pittsburgh | 18% | 53.1% |
| Minn/St. Paul/Bloomington | 4.7% | 87 % | Minneapolis | 14.5% | 60.7 % |
| Denver -Aurora | 4.3% | 85.8 % | Denver | 6.5% | 70.4% |
| Salt Lake City metro | 3.6 % | 88.1 % | Salt Lake City | 6.7% | 69.3% |
| St. Louis MO-IL | 2.4% | 91.4% | St. Louis | 7.9% | 71.6% |
| Indianapolis - Carmel | 1.2 % | 93.2 % | Indianapolis | 2.3% | 82.9% |

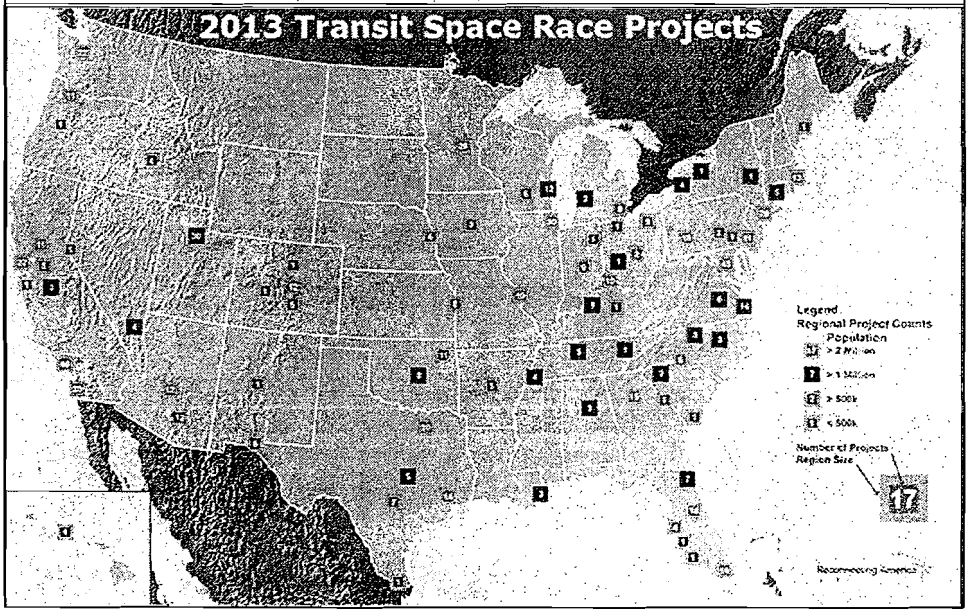
Source: Governing.com from 2011 American Community Survey data; 2011 ACS data

**New automotive technology: An effective alternative to expanded transit?**

Advances in electric vehicle technology and higher fuel mileage gasoline and diesel automobiles are very promising and have already reduced the pollution and energy consumption from automobiles, but personal vehicles still have significant environmental impact, particularly in urban areas and on congested roads.

- Hybrid electric vehicles and plug-in electric vehicles are a very small share of the global vehicle market – expected to reach 7% of the market by 2020.
- Plug-in electric vehicles in Indiana are powered by coal-based electricity.
- U.S. vehicle fleet is 11.4 years old – Americans are holding on to cars longer.
- Cleaner vehicles don't address the needs of those who cannot drive or can't afford a vehicle or a second vehicle.


# DEMAND FOR TRANSIT IS GROWING

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ADWEEK Introducing Project Isaac

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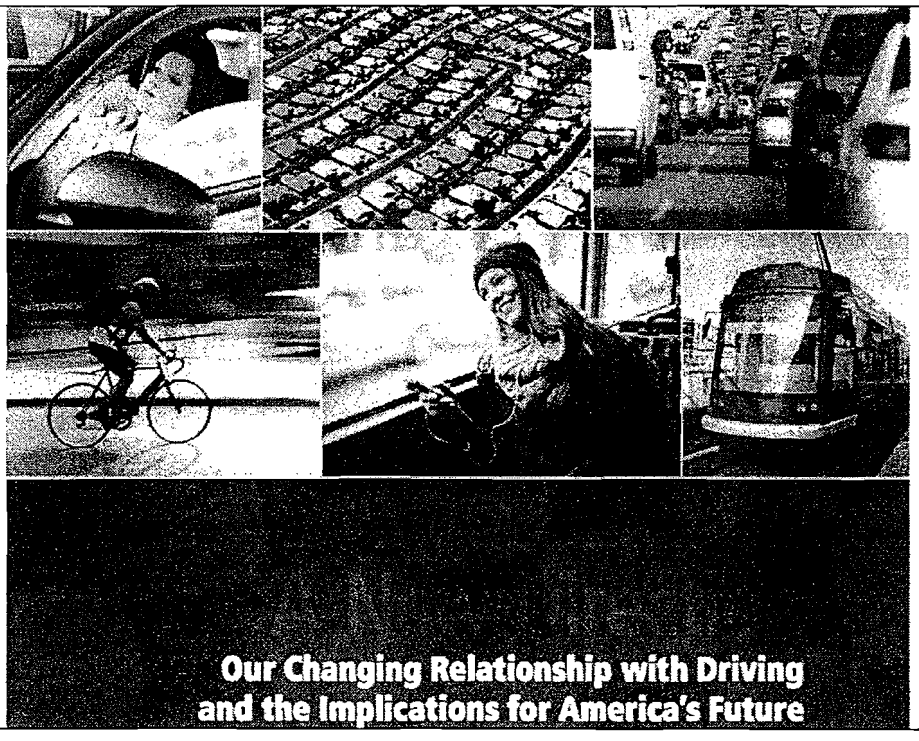
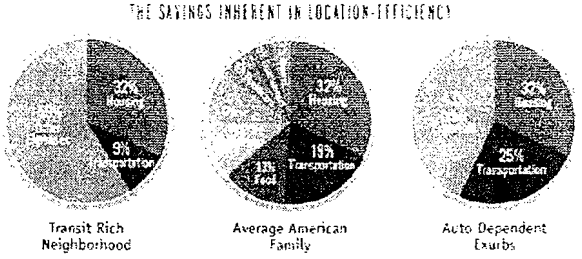
## Young People Are Driving Less

American millennials [illegible] for alternative transportation



# Transit Reduces Household Costs

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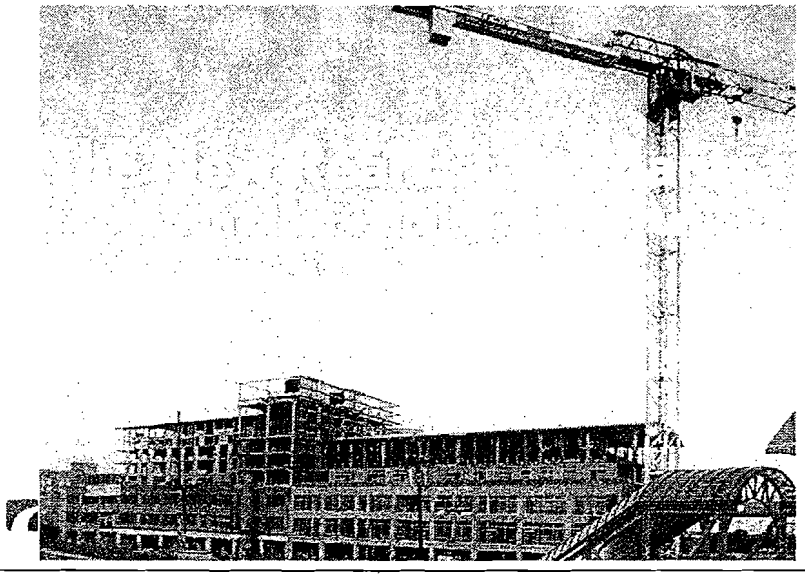
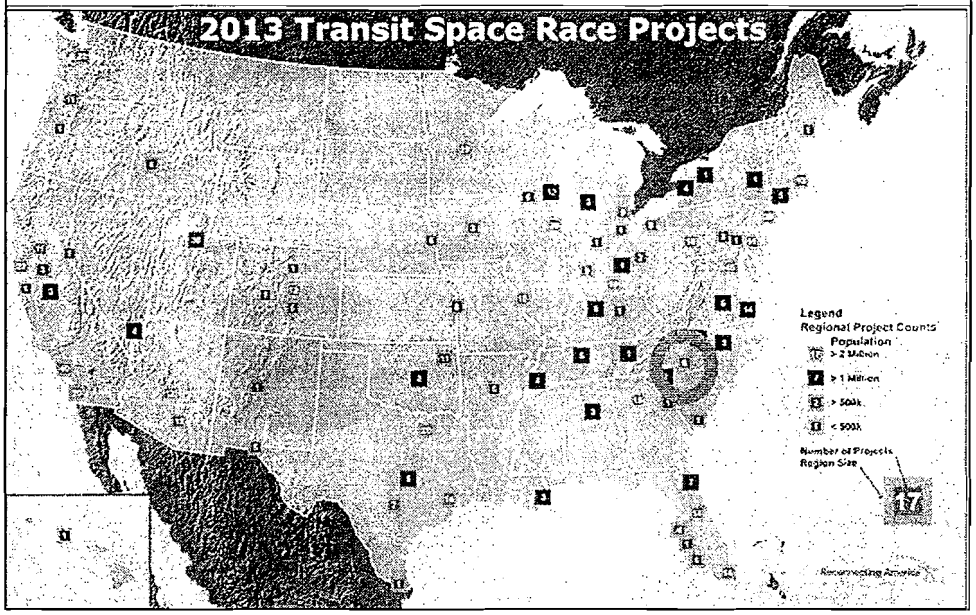
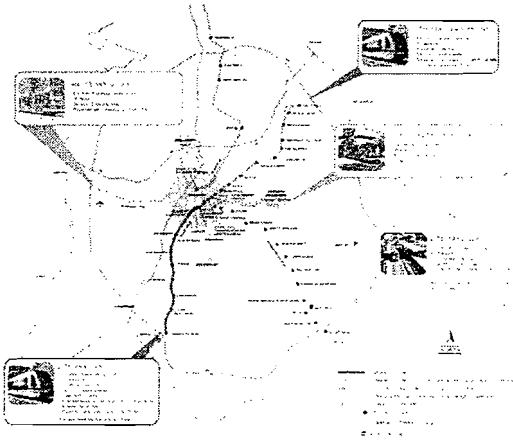
# Market Demand



# DEMAND FOR TRANSIT IS GROWING




# Charlotte's Transit Success



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# Charlotte's Transit Success

- Lynx Blue line
  - Carries 15,400 people/day – 85% of projected 2025 ridership
  - ***72% of riders did not use transit before***
  - Overall transit ridership up 19% in Charlotte

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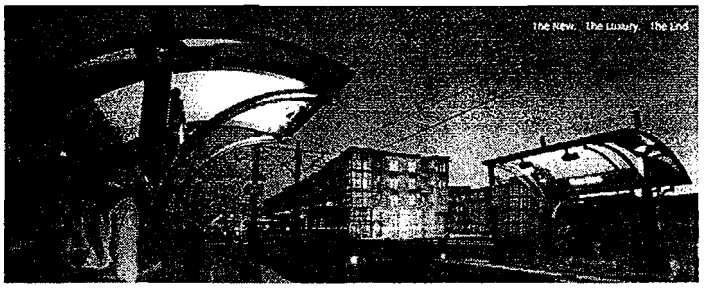
# Charlotte's Transit Success

Transportation For America

# Charlotte's Transit Success

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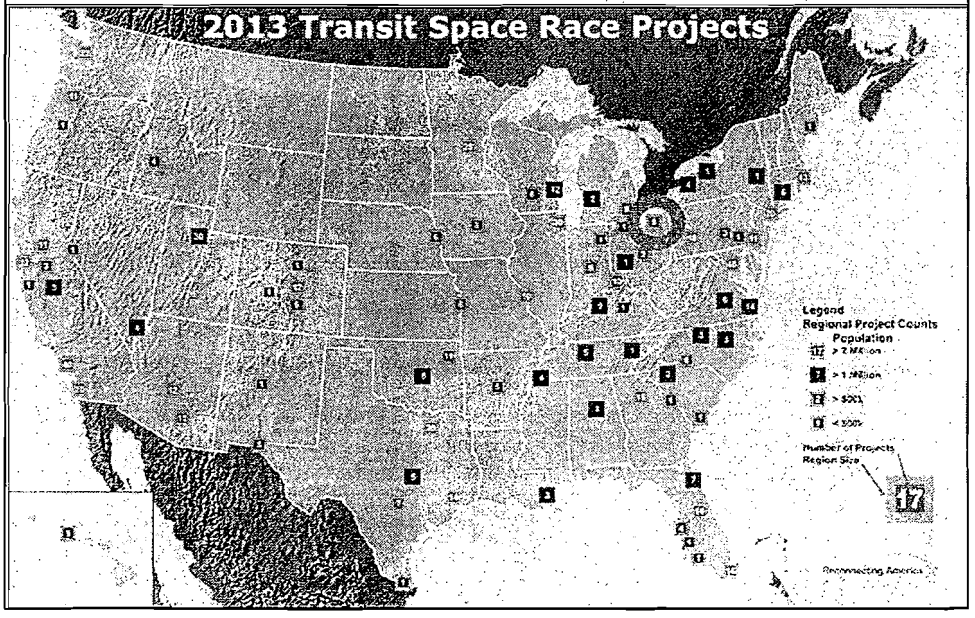

# Cleveland's BRT Success

- Healthline BRT
  - Opened in 2008 replacing local bus service
  - Ridership increased 54% - 14,300 people/day
  - Reduced transit travel time 29% along corridor
- Transit system funded with 1% sales tax

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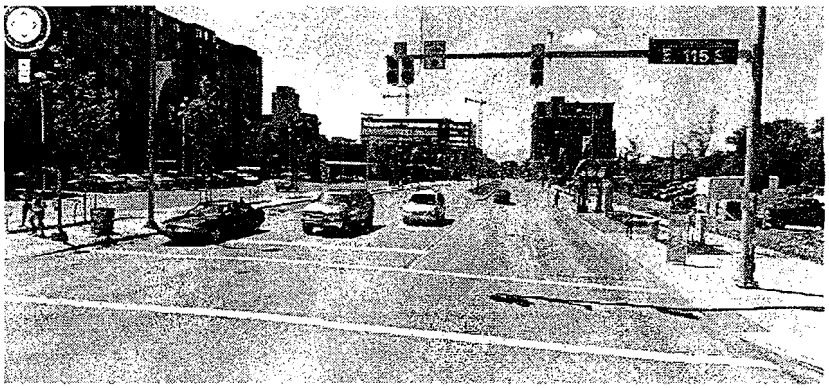
# Cleveland's BRT Success

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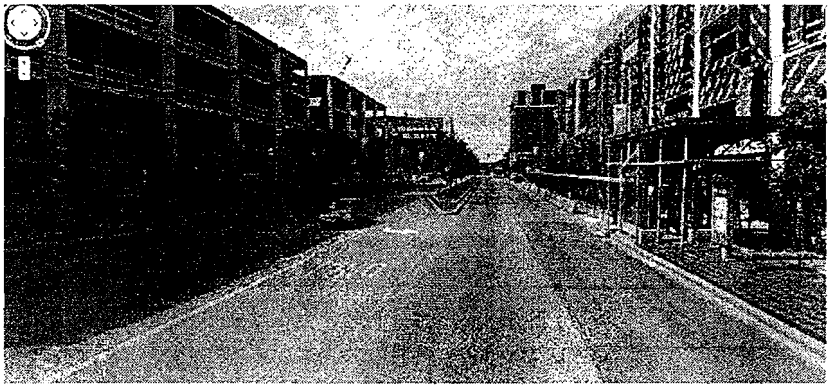
# Cleveland's BRT Success



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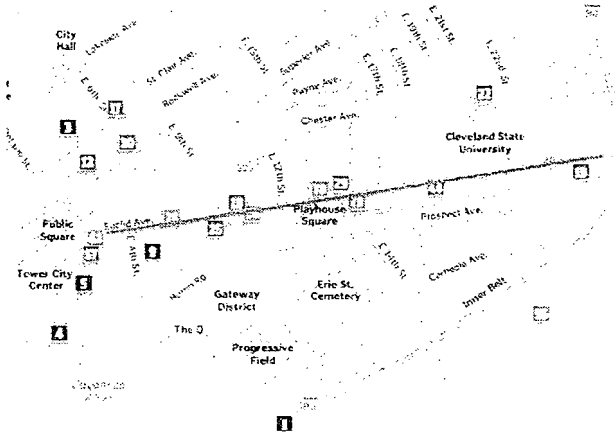
# Cleveland's BRT Success

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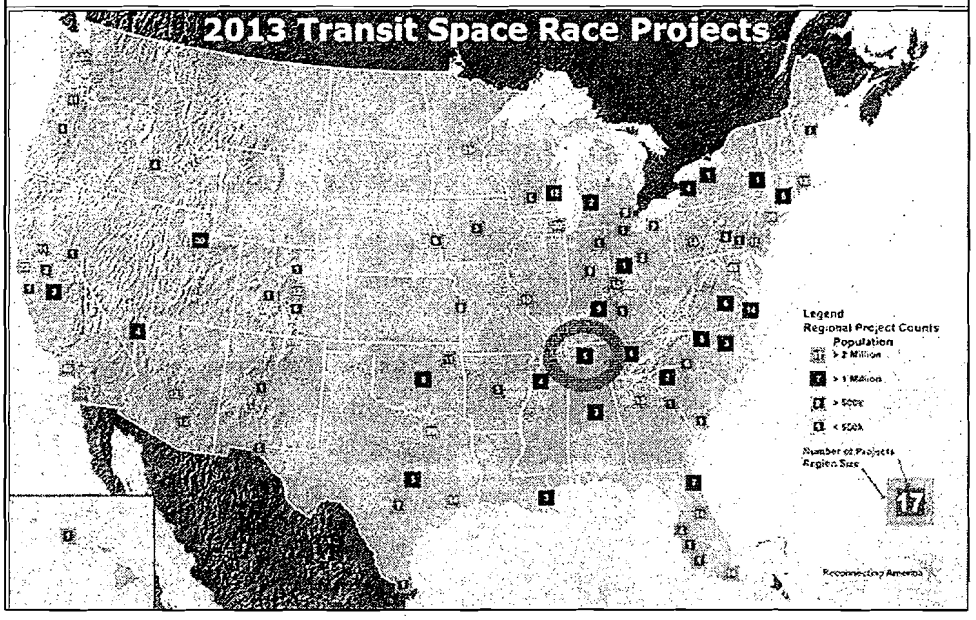
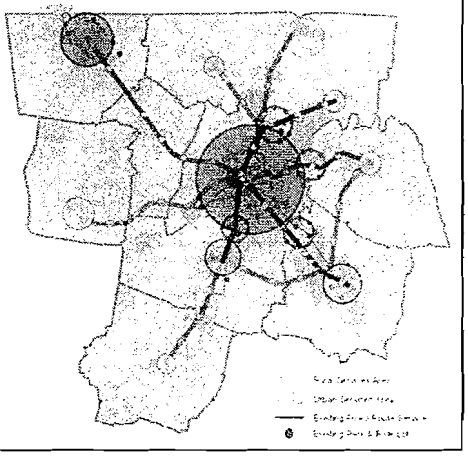
# DEMAND FOR TRANSIT IS GROWING




# Nashville's Transit Plan

- Plan for network of regional rapid transit lines
- Advancing first-line – the "Amp" through New Starts process
- Obtained legal authority to implement regional taxes in 2009
- Received a $10M TIGER V grant



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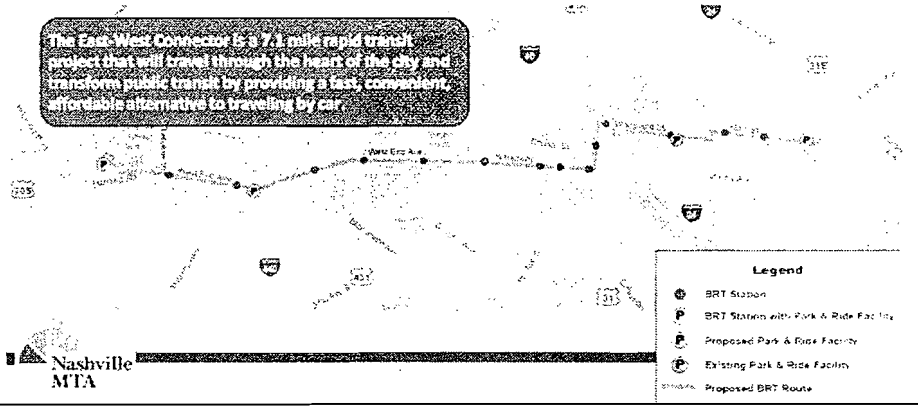
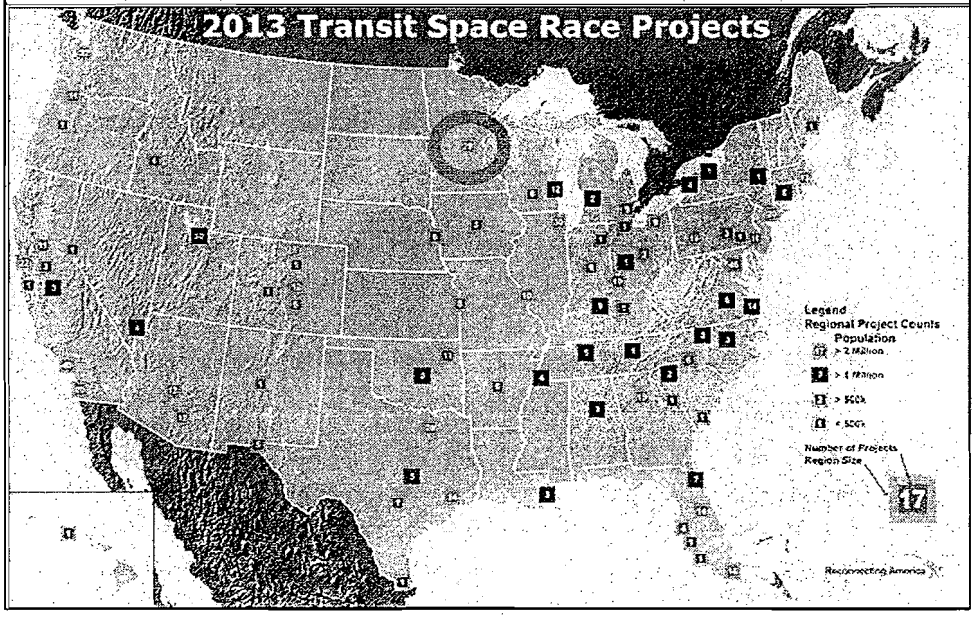
# Nashville's "Amp"

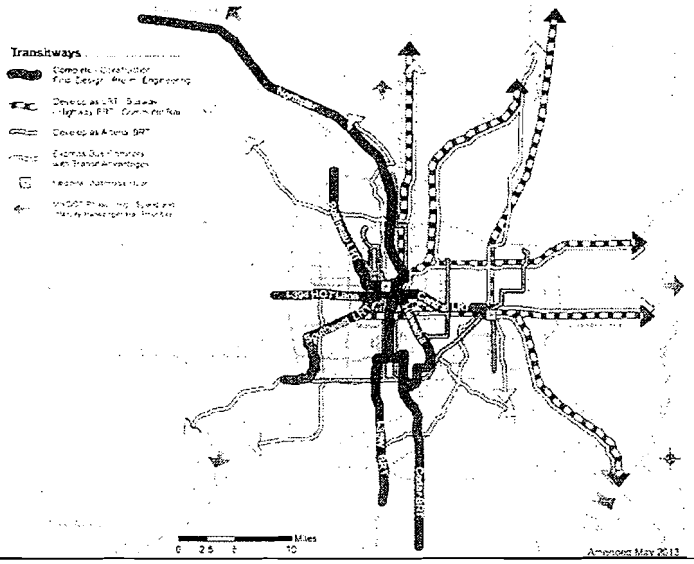
- Reduces transit travel time by 20%
- Reduces vehicle travel times by 15%




# DEMAND FOR TRANSIT IS GROWING



# Twin Cities' Transit Success




# Twin Cities' Transit Success

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# Twin Cities' Transit Success

*Figure 1: Benefits and costs of the regional transit system from completion of build-out to 2045, compared to base case (2010$ Millions)*

| | Compared to Base Case Scenario | | | |
|---|---|---|---|---|
| | | Total direct impacts | | IRR |
| Scenario | Investment cost | Low | High | |
| **1: 2030 Regional Plan** *(Benefits/costs accrue 2030–2045)* | $4,361 | $6,571 | $10,083 | 7.8-14.8% |
| **2: Accelerated Regional Plan** *(Benefits/costs accrue 2023–2045)* | $5,289 | $10,762 | $16,516 | 11.2-18.0% |
| **3: 2030 plan with more growth near stations** *(Benefits/costs accrue 2030–2045)* | $4,361 | $9,082 | $13,927 | 13.0-20.9% |

Source: Cambridge Systematics analysis based on MetCouncil TDM output

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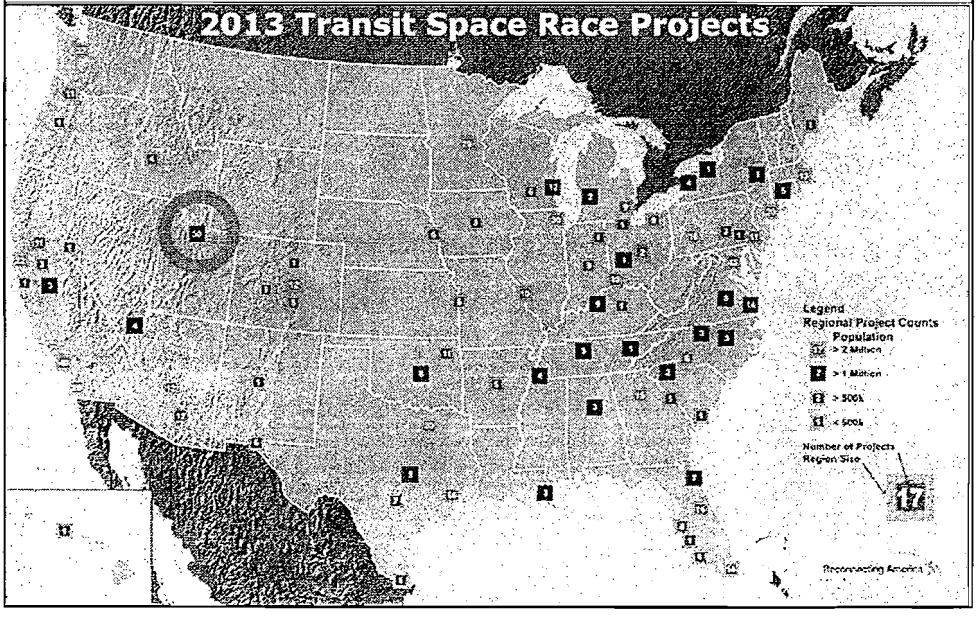
ITASCAproject

# DEMAND FOR TRANSIT IS GROWING



# Salt Lake City's Transit Success

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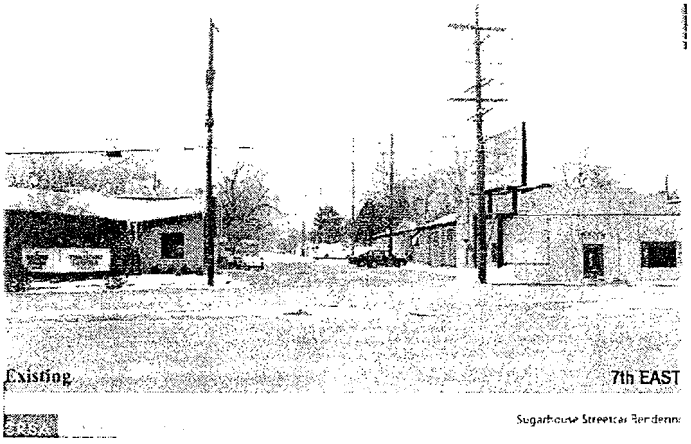
# Salt Lake City's Transit Success

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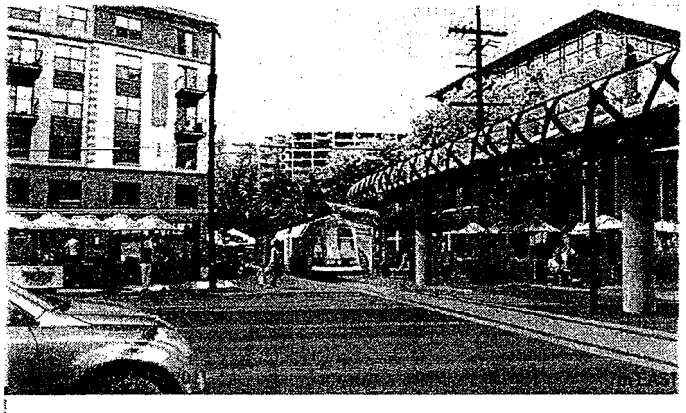
# Salt Lake City's Transit Success



Sugarhouse Streetcar Rendering

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# Salt Lake City's Transit Success

| Line | Total Development | Transit Induced | % Transit Induced |
|---|---|---|---|
| North/South | $3,967,135,572 | $2,287,820,272 | 58% |
| University Line | $730,050,000 | $346,550,000 | 47% |
| University Campus | $905,751,289 | $314,340,038 | 35% |
| West Valley* | $204,400,000 | $64,900,000 | 32% |
| Front Runner North | $250,000,000 | $250,000,000 | 100% |
| TOTAL | | | 54% |
| | | | |
| To be built | | | |
| Sugarhouse Streetcar | $405,000,000 | $400,000,000 | 99% |

*Includes constructed and planned

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# Comparing Peer Cities

| | Columbus | Charlotte | Salt Lake City |
|---|---|---|---|
| Population | 1.4M | 1.3M | 2.1M |
| Transit Budget | $84M | $101M | $187M |
| Annual Trips | 18.8M | 26.8M | 40.5M |

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# Moving Forward

- Competitors are ahead of Indianapolis region and will continue to move forward with plans
- Have an opportunity to put in place base for a rapid transit system before congestion overwhelms region
- Dedicated revenues for transit are a key to success

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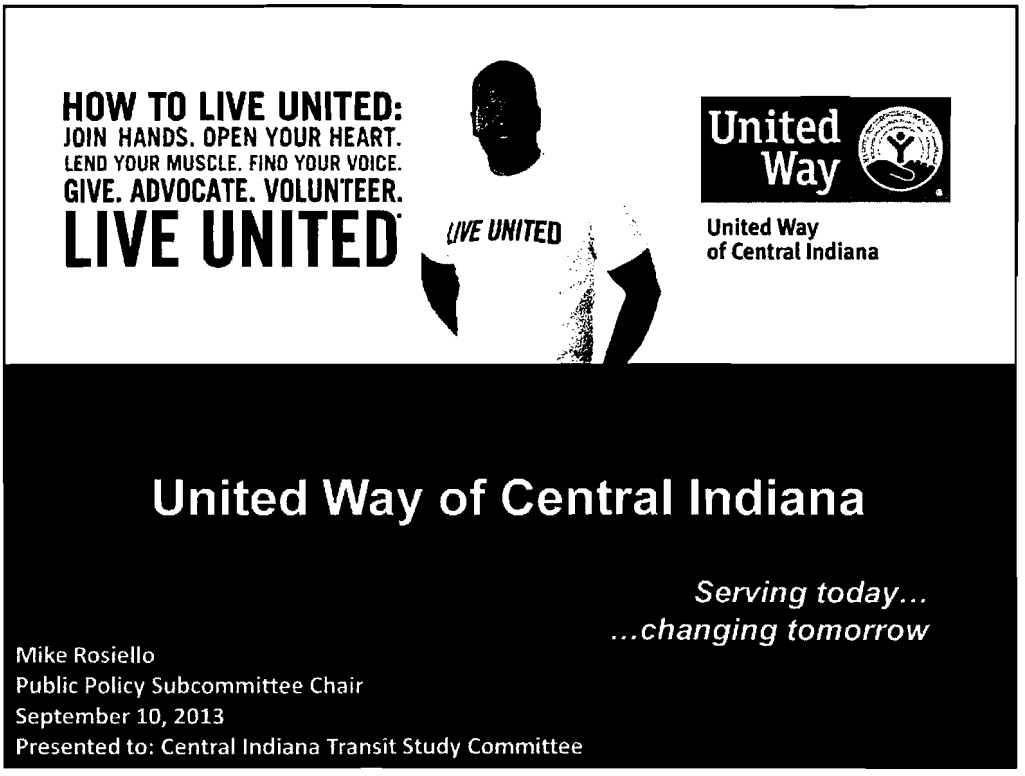


Thank you, Senator Miller.

Again, my name is Mike Rosiello. I am a partner with the Barnes & Thornburg Law firm and I serve as a Board Member and as the Public Policy Subcommittee Chair for the United Way of Central Indiana. Thank you for giving me time today to discuss United Way and explain why we support efforts to improve Central Indiana's Public Mass Transportation system from a human services perspective.

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Ex. 6

# What Do We Do?

United Way
United Way of Central Indiana

*We harness the **collective compassion** and **resources of our community** to improve lives!*


2

What we do in its simplest form is:

**We improve lives.**

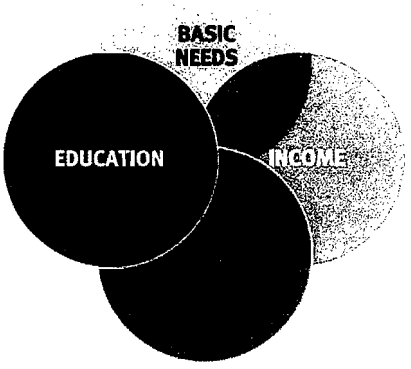
**Vision**

United Way's vision is for Central Indiana to be a community where children, individuals, and families thrive; neighbors care for each other; and we are proud of all our residents' quality of life.

# Our Mission

United Way
United Way of Central Indiana

*To help people **learn more**, **earn more** and **lead safe and healthy lives**.*

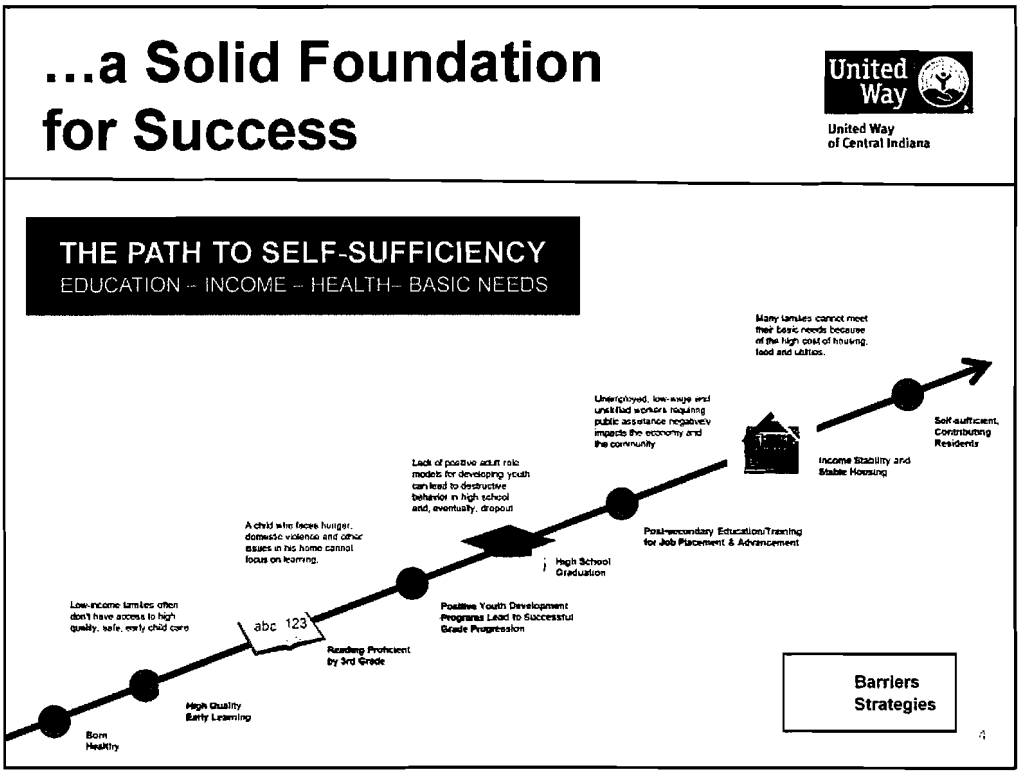



3

We do this by focusing our efforts in four key areas:

- **Basic needs** – know when basic needs are not met, people are not in a position to strive for self-sufficiency
- **Education** – because we know that education is the best path out of poverty
- **Income stability** – because paying more than 30% of income on housing puts families at risk and prevents a stable foundation from which to grow
- **Health** – because without good health, children can't learn, parents can't earn consistently and the cost of healthcare puts pressure on our citizens and our community

We believe education, income, health and basic needs are all **connected.** **And a key connector to those four areas is a reliable regional mass transit system.**




The opportunities in our community are many. UWCI works strategically to address issues that prevent individuals and families from self-sufficiency – along the whole continuum. This graphic depicts the barriers that individuals face from birth that prevent them from becoming self-sufficient contributing members of our community. It also shows the strategies that can help individuals reach that goal.

All along this continuum strategies in the area of education, income, health and basic needs provide a framework for United Way to help individuals and families to help themselves. Filling the gaps and connecting the dots is critical **– A RELIABLE REGIONAL TRANSPORTATION SYSTEM IS CRITICAL TO CONNECTING THOSE DOTS.**


When people think about us, they think about agencies. To achieve our Vision and Mission, United Way is pleased to partner with 90+ non profit organizations in Central Indiana.

This is just a sampling. You will recognize the names. UWCI invests in agencies such as Goodwill, Bosma Industries and Community Centers and helped 4,100 individuals find and hold a job and 7,389 increase their income.

These agencies provide: Job Training, Health Services, Youth Development Programs, and Childcare - just to name a few. But if citizens cannot access the services through reliable public mass transportation, they cannot achieve their goals.

# Why does transit matter to United Way?

United Way
United Way of Central Indiana

At United Way, we know that income stability is key to self-sufficiency. We view transportation as a human services issue – a lack of a regional transit system can be a barrier to employment, job searches and training, child care, medical appointments, and youth activities.

6

A stable income is critical for individuals and families to thrive.

# Why does transit matter to United Way?

United Way
United Way of Central Indiana

JOHN H. BONER Community Center

Reports from Job Coaches from the Centers for Working Families...

**Brittany**

**Colleen**

**Charlie**

7

Brittany - Brittany had a job interview at Embassy Suites on North Michigan Road on Saturday. The position was from 5 a.m. to 1 p.m. and she cannot accept it because she does not have a car and cannot get bus service to get there. She remains unemployed.

Colleen – She is starting a new job at Perkins at 86th and Allisonville Road. She will be taking the bus to and from work. However, if she works past 8 on Sunday evening she walks home the several miles to Woodruff Place or takes a taxi, consuming much what she makes that day. Her ability to increase her income is stifled.

Charlie – He believed he had a skill set that matched a company in the southeast corner of Indianapolis. However, he could not get closer than 1 mile or more from the location of the job by riding the bus. Adding a 20 to 40 minute walk on top of a bus ride makes it difficult for people to be on time and ready to go to work when they get there. He remains unemployed.

# Why does transit matter to United Way?

United Way
United Way of Central Indiana

Agencies also report ongoing challenges with transportation for Senior Citizens, leading to:

**-- Increased Medicaid/Medicare Costs for transportation to medical treatments**

**-- Loss of independence and productivity for Hoosier Seniors**

Brittany - Brittany had a job interview at Embassy Suites on North Michigan Road on Saturday. The position was from 5 a.m. to 1 p.m. and she cannot accept it because she does not have a car and cannot get bus service to get there. She remains unemployed.

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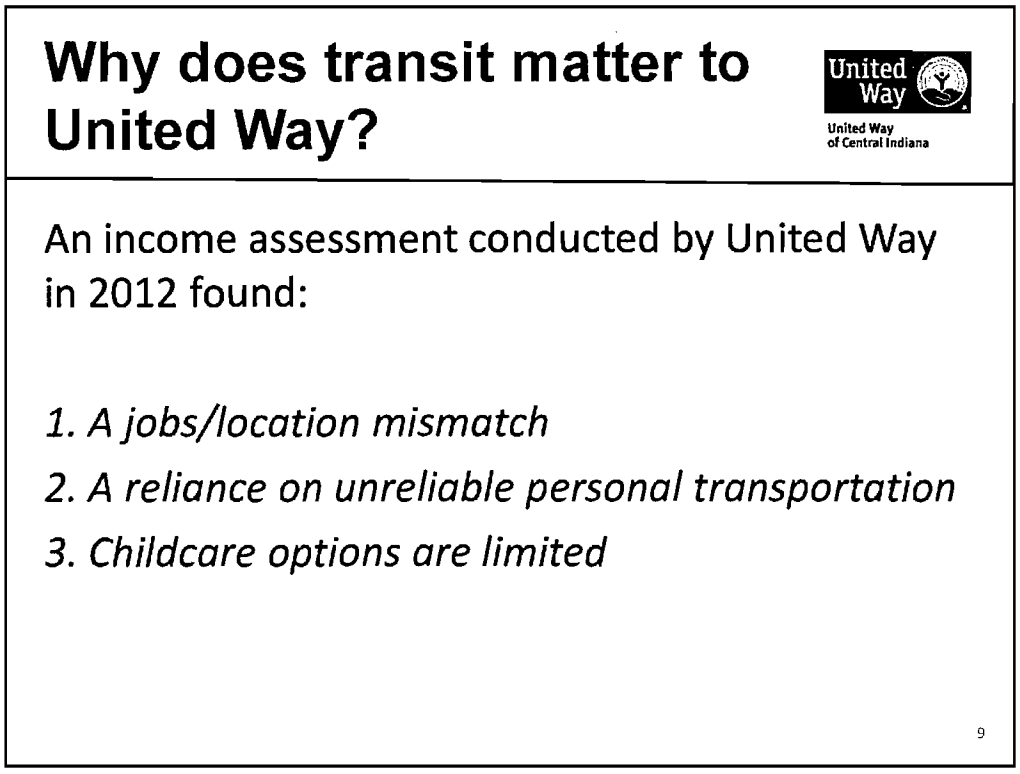
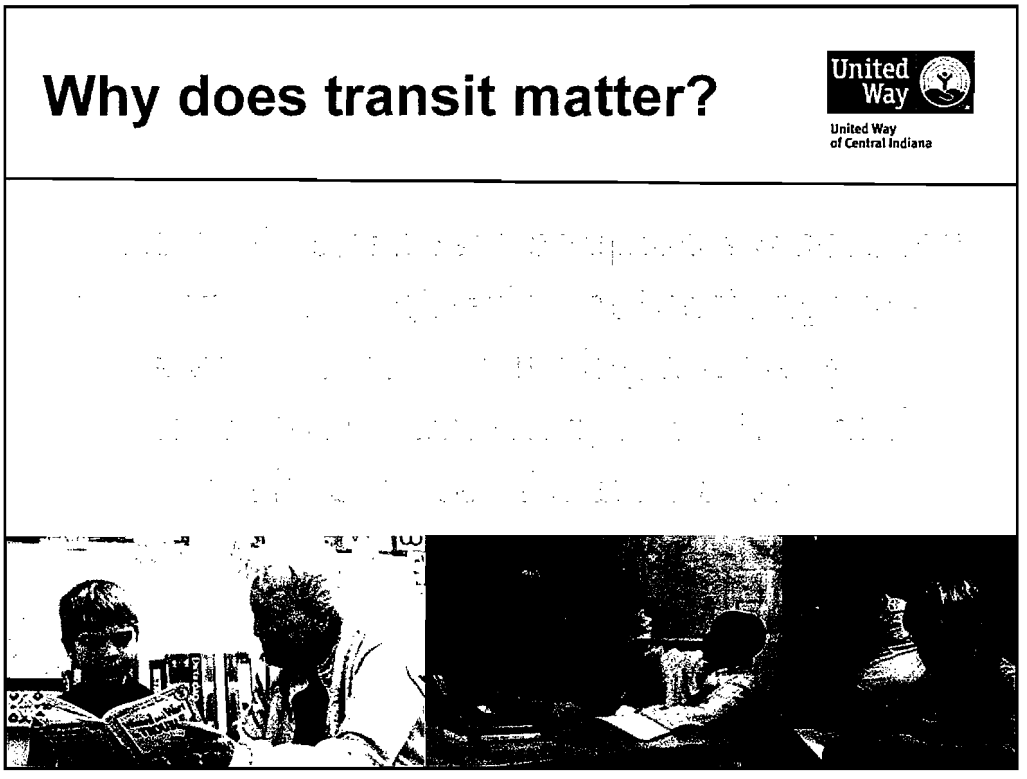



1. The majority of the region's low income population and a large proportion of those at lower levels of education and skills live in the Central part of Marion County. Over the past several years, employment opportunities for which this population might be suited have tended to develop on the periphery of Marion County around Interstate 465 and farther into surrounding counties (i.e. warehousing, large scale retail, spread of hospitals and other health care providers). Jobs must be assessable to workers.

2. The absence of a regional transit system that connects workers to available job locations means that workers will almost certainly need to rely on personal transportation. A minor issue such as a dead car battery can become a major barrier to keeping a job.

3. The likelihood that a person will be able to find a dependable bus line that is both on his/her way to work and their child care provider is low.



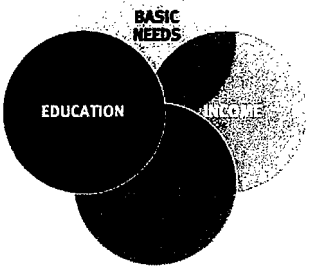

This is an issue that touches many lives. United Way strongly believes that it's evident that an enhanced and expanded public transit system in our communities would help people access jobs and many more needed services and help more families achieve financial stability.

A truly viable public transit system is integral to helping people achieve economic self-sufficiency, maintain it and pass it on to their children and their children's children.

# We Have Big Plans!

United Way
United Way of Central Indiana

*Together we can **transform our community**!*





11

- At United Way, our vision is bold.
- Our goals are achievable.
- We look forward to continue to partner with the **community** to expand options for public transportation to allow all of Central Indiana's citizens to learn more, earn more, and lead safe and healthy lives.

- Thank you.

# Indianapolis Public Transportation Corporation

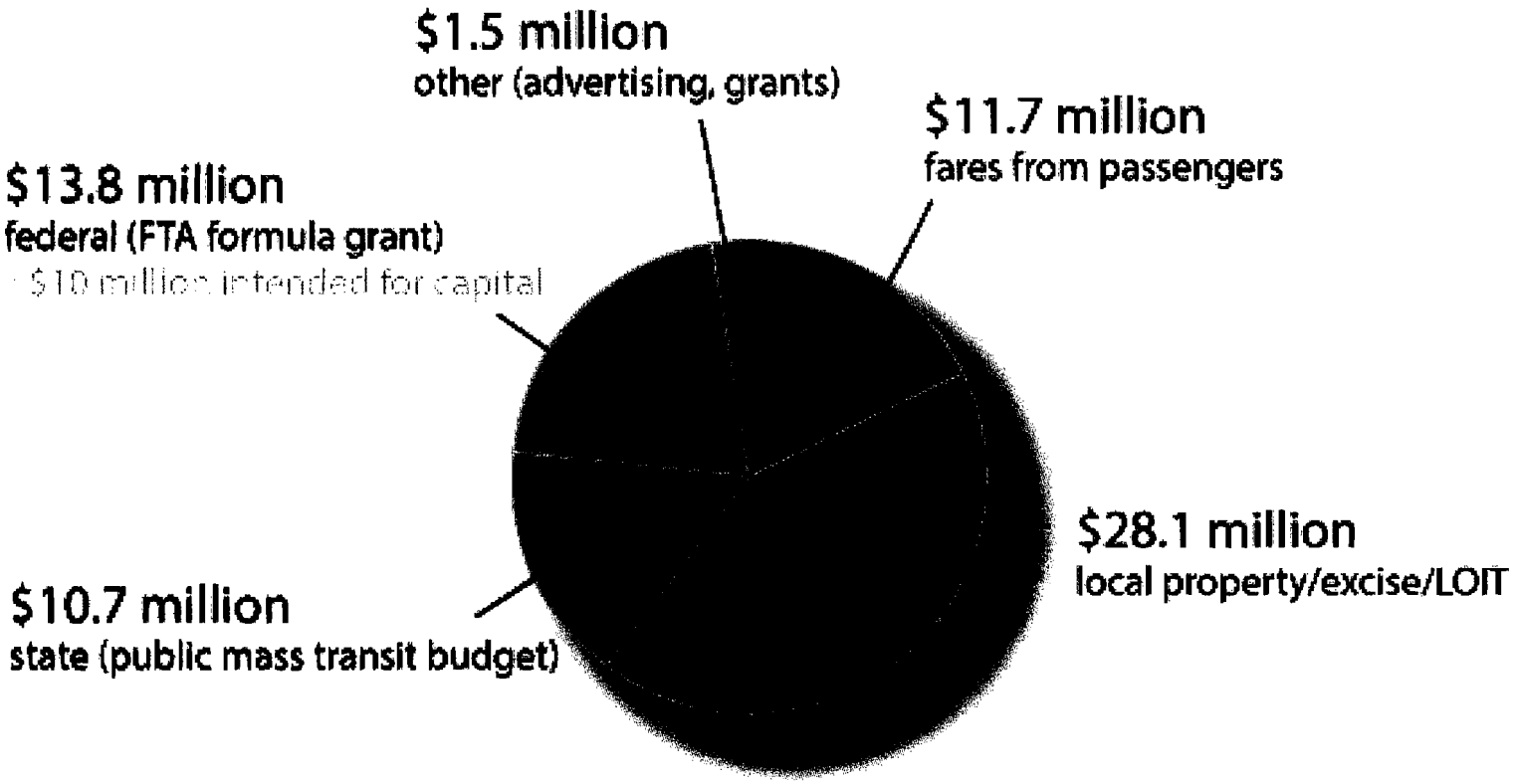
## Michael Terry, President & CEO
## Tuesday, September 10, 2013

Indiana State Legislative Summer Study Committee, Transportation


CITS
9/10/13
Ex. H

# 2014 Operating Revenues

**$66M**



# Additional Budget

Capital- $44.5M (total budget)

- Most projects 80% federally funded; 20% local match (cumulative fund)
- Federal funds – formula and competitive grants

Cumulative Fund

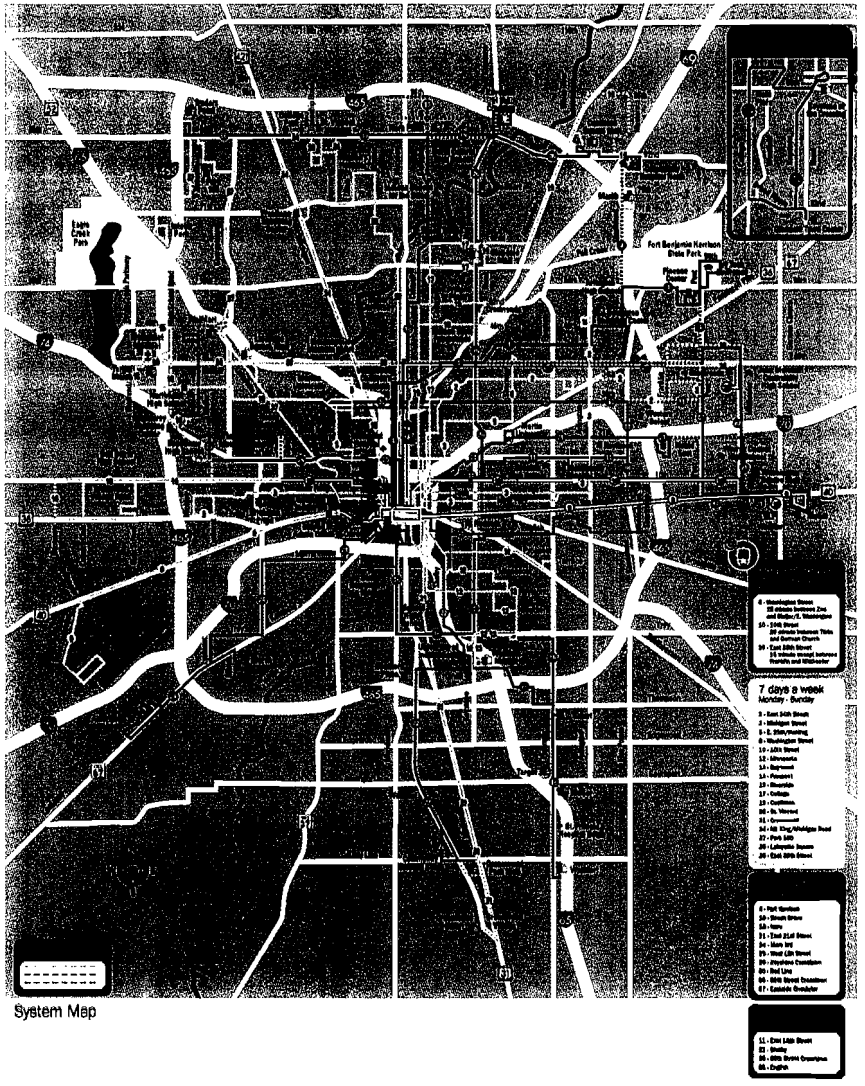
- Funded by a portion of property tax revenue [$.01/$100 av] plus miscellaneous local
- $3.5 million projected income in 2014
- Funds are used to match formula and competitive grants

Debt Service

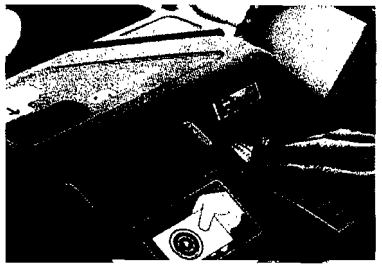
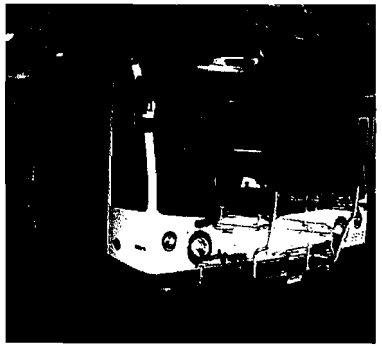
- Funded by a portion of property tax [$.0067/$100 av] plus miscellaneous local
- $2.3 million projected revenue
- Funds bond payments
- Bonded debt paid off in 2016

# Current System

- 31 routes serve Marion County
- 27 routes converge downtown
- Open Door/Paratransit throughout Marion County




System Map


# 2013 Service Improvements

**In 2013, $6M in additional service was implemented using the 2010 COA (Indy Connect Bus plan) as enhancement guide.**

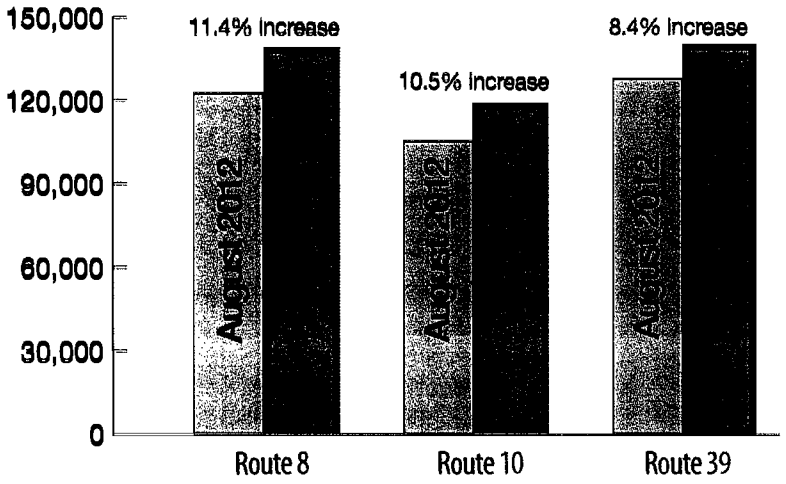
**Phase 1, Feb. 2013:**

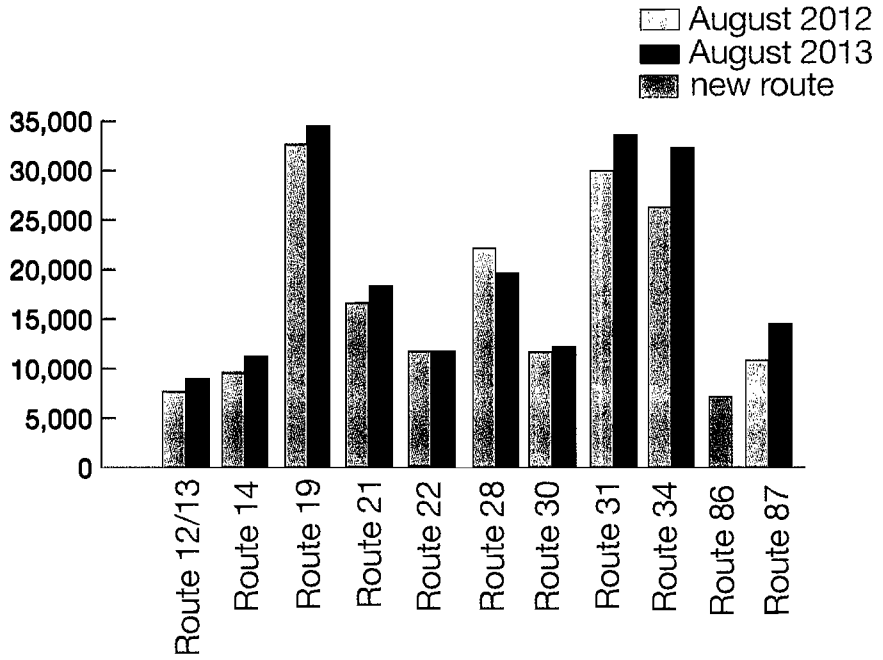
- Frequent service on core routes
- New Sunday and later weekday service
- Route alignments for efficiency

**Phase 2, June 2013:**

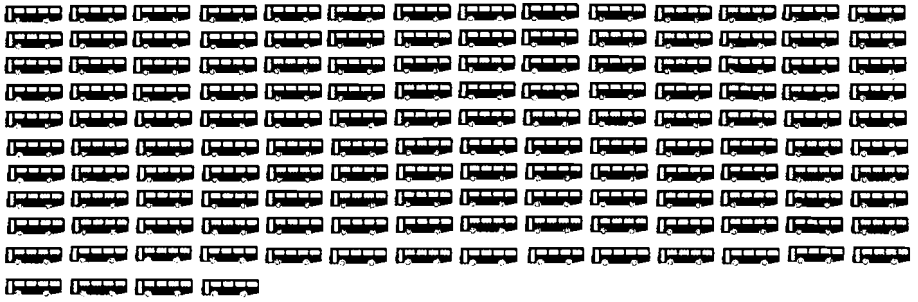
- Introduce new cross-town service
- Improve frequency
- Route alignments for efficiency

# 2013 Service Results



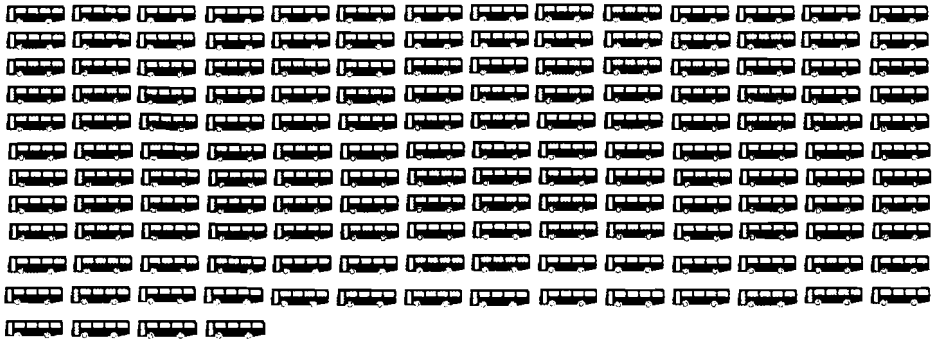




# Fleet Changes



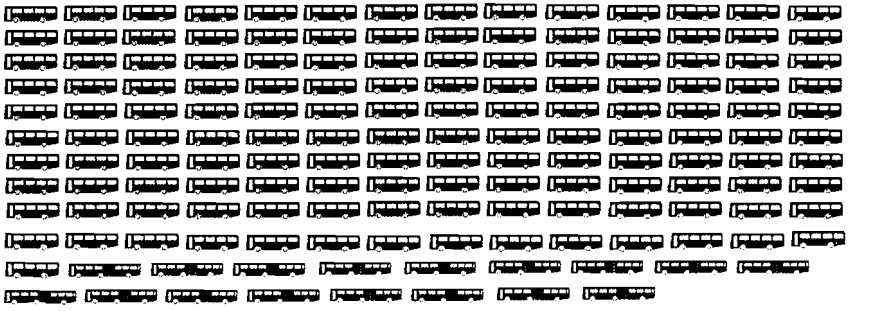
Diesel
Hybrid

2012 Fleet- 144



Diesel
Hybrid

2013 Fleet- 158

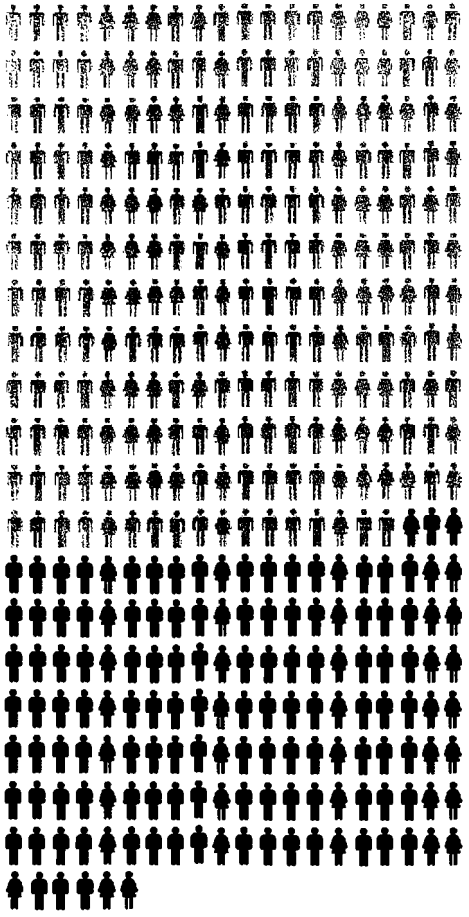


Articulated
Diesel
Hybrid

2013 year-end fleet – 158
17 refurbished articulated buses

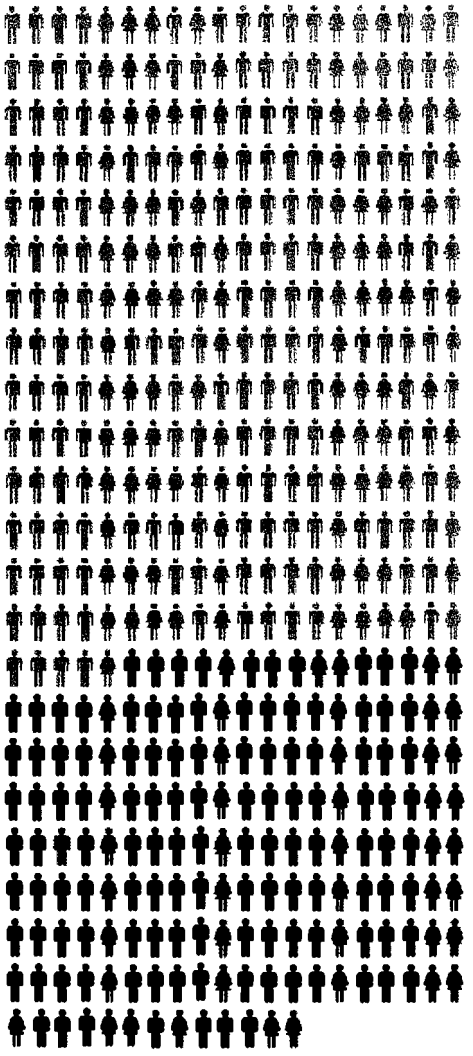
# 2013 Job Creation

**SUMMER 2012**



471
total employees

**SUMMER 2013**



533
total employees

# Ridership Comparisons

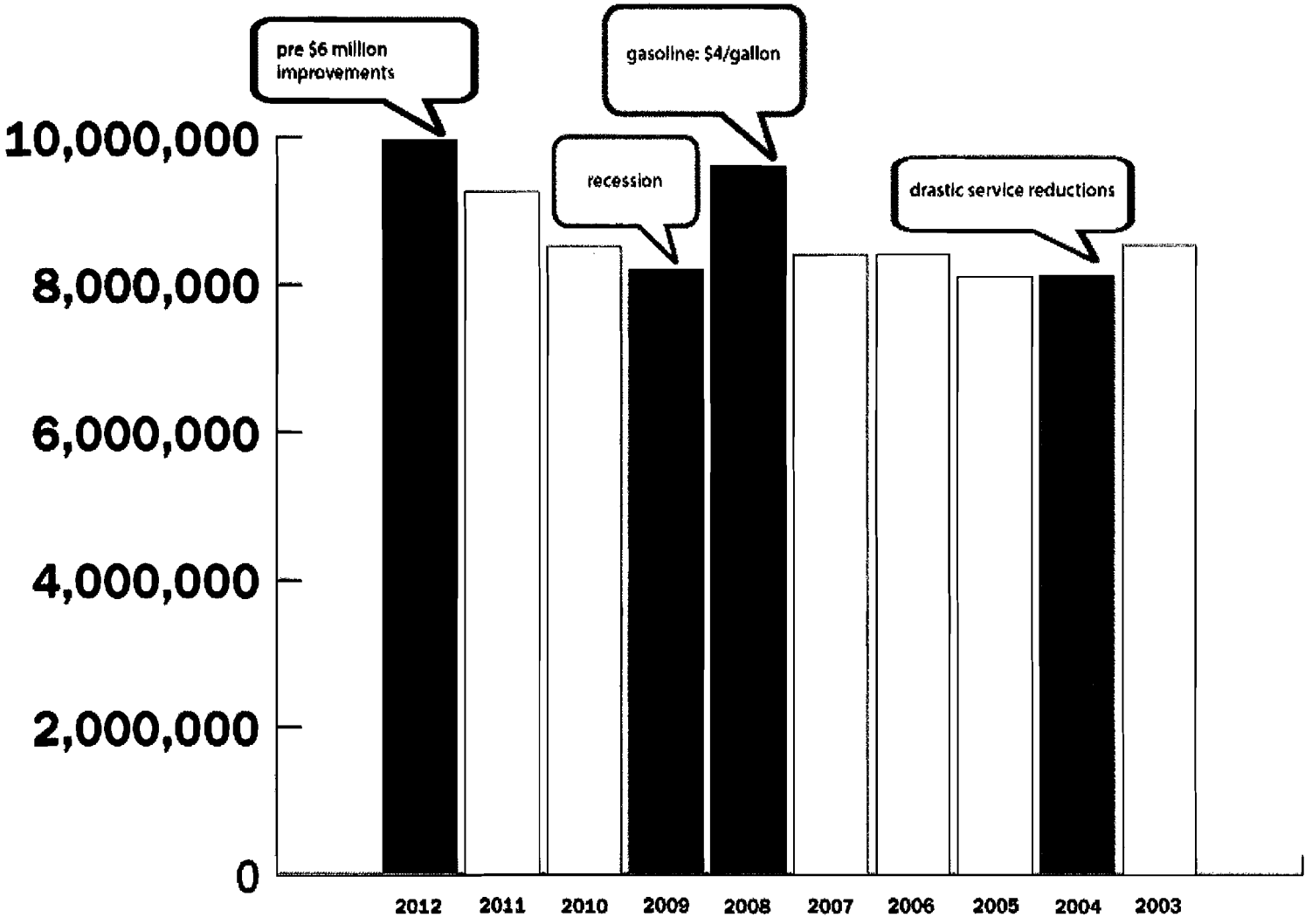
2013 – Highest ridership since early 1990's

- 6.7 million passenger trips through August
- 967,000 passenger trips in August

2004 –

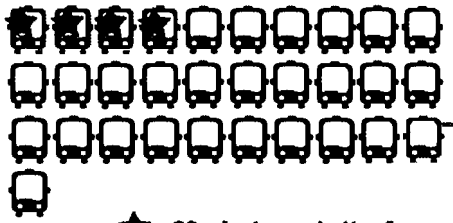
- Dramatic service reductions due to budget
- Eliminated 11 routes, including express and circulators
- Eliminated some Saturday and Sunday service
- Reduced route frequency
- 8.1M passenger trips in 2004

# Ridership


pre $6 million improvements
gasoline: $4/gallon
recession
drastic service reductions
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
2012
2011
2010
2009
2008
2007
2006
2005
2004
2003

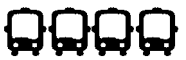
## Weekday Routes/Last Downtown Departures

Before 6 pm: 31 routes



After 9 pm: 14 routes

After 11 pm: 4 routes

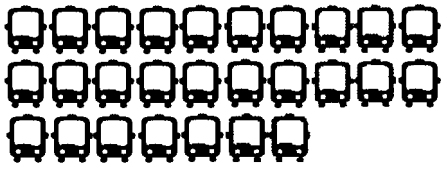


38,000 average rides

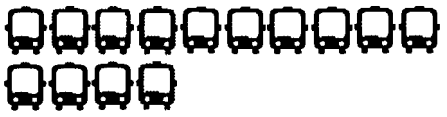
★ =20 minutes or better frequency

## Saturday Routes/Last Downtown Departures

Before 9 pm: 27 routes



After 9 pm: 14 routes



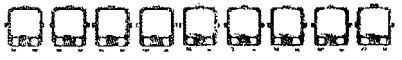
After 11 pm: 2 routes

20,000 average rides

## Sunday Routes/Last Downtown Departures

Before 5 pm: 17 routes

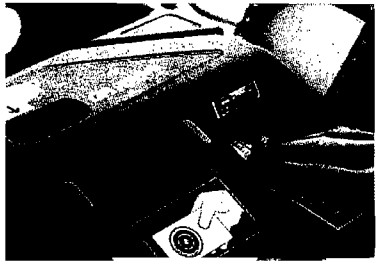
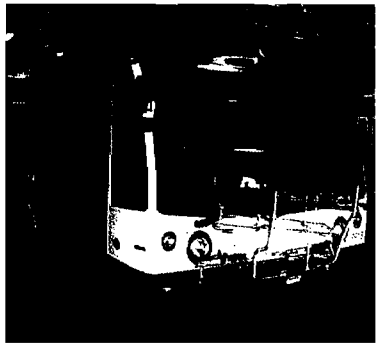
After 8 pm: 9 routes

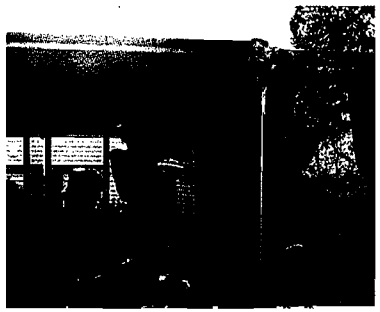


After 9 pm: none

10,500 average rides

While the demand for transit is increasing, as are ridership numbers, current service levels are still minimal

# What's needed?

Additional funding would mean:

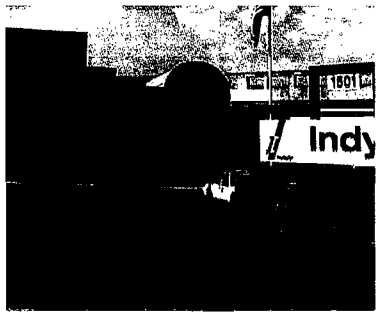
- Increasing weekend service levels
- Increasing the span of operating hours all 7 days
- Streamlining some of the routes, eliminating confusing and/or low-productive branches
- Increasing the frequency on many of the routes, including highest performing routes

Then

- Introducing express and limited stop service (BRT on high performing corridors)
- Removing local stops with improved pedestrian access (with the addition of new and repaired sidewalks)
- Introducing community circulators to improve access to local, express and/or BRT lines

Other considerations

- Additional transfer centers including downtown
- Improved transit stops throughout the system; larger station stops for BRT corridors
- Park and ride facilities
- Additional maintenance and storage facilities




# What's needed?

Transit Planning

- IndyGo uses the Comprehensive Operational Analysis (2010 Indy Connect Bus Plan)
- Adheres to federal (FTA) regulations and guidelines including Title VI, 13 C
- Tracks productivity and adjusts appropriately (according to FTA regs, public input, political will)
- Plans according to operating budget and revenue assumptions (including federal formula and competitive grants)

Operating Costs (only fixed route expenditures)

- For planning purposes, IndyGo uses $95/hr to calculate hours of service (revenue and non-revenue)
- Current annual hours x $95/hour = $51M
- Doubling Current Service levels with a blend of services (local, circulators, express, BRT/limited stop) = $100M+

Capital expenditures (current pricing levels)

- New diesel buses = $500,000
- New Articulated vehicles = $1M+
- Used Articulated vehciles = $400,000
- Reconditioned electric buses = $500,000+
- Dowtown Transit Center = $17.5 M (budget for current)
- Replacement cost for current IndyGo Headquarters/Maintenance facility = $56M

# Momentum

- The demand for service continues to grow
- The $6M infusion demonstrates investment leads to growing ridership
- A new Downtown Transit Center is planned for Q4 2015 – primarily federally funded
- IndyGo continues to apply for and receive competitive grant dollars:
  - $10M State of good repair for new buses
  - $10M TIGER to recondition standard diesel to all electric buses
  - JARC, CMAQ, STP funds for real time bus arrival, transit outreach and IT

# Momentum

A new funding source is needed. Our current funding options are statutorily constrained. For IndyGo as an implementer of transportation planning and operator of transit services to respond to the growing population and demand for additional transit, our board of directors and local leaders need access to new revenue sources.